Microlab® 300 Series Pipettor
User Manual

HAMILTON®

Warranty Information

Hamilton Company warrants this equipment[1] to be free of defects in material and workmanship for 12 months from the date of receipt. The warranty does not cover normal wear and tear of the syringes, valves or equipment. The warranty extends to the buyer of record on the original purchase order to Hamilton Company. Hamilton Company or an authorized Hamilton representative agrees to repair or replace, at its option and free of charge to the buyer at a normal place of business or at a Hamilton repair facility, any part or parts that under proper and normal use appears to be defective during the warranty period.[2] Abuse, unauthorized replacement of parts, modifications or adjustments made by other than Hamilton Company or its authorized representative voids this warranty.

This warranty grants you specific rights. No other warranties, expressed or implied, including implications of warranties of merchantability and fitness for a particular product, are made. Hamilton Company's product liability shall be limited to repair, replacement or price refund of any defective product.[2]

Hamilton Company endeavors to provide prompt and satisfactory service.

1- All Hamilton Company valves are warranted to be free of defects in material and workmanship at the time of delivery.

2- Hamilton Company reserves the right to refuse to accept the return of any instrument or valve that has been used with radioactive or microbiological substances, or any other material that may be deemed hazardous to employees of Hamilton Company.

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Compliance

This equipment has been tested and complies with the limits for a class B digital device, pursuant to Part 15, Federal Communication Commission (FCC) Rules. These limits are designed to provide reasonable protection against harmful interference in an installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, Hamilton Company cannot guarantee that no interference will occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- **Turn the Microlab® 300 off and on to determine whether it is generating interference.**
- **Reorient or relocate the receiving antenna.**
- **Increase the separation between the equipment and receiver.**
- **Connect the equipment into an electrical outlet on a circuit that is isolated from the circuit to which the receiver is connected.**
- **Consult the dealer or an experienced radio/TV technician for help.**

This equipment has been verified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with the FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of the manufacturer could void the user's authority to operate this equipment.

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Welcome

Welcome to the World of Hamilton Precision Instruments.

Congratulations on purchasing the Hamilton Microlab 300 Series Pipettor. The Microlab 300 is a hand-operated, semi-automatic, precision pipetting device that provides accurate liquid handling via one pipette probe over the complete pipette volume range of 0.5 µL to 1 mL.

The Microlab 300 functions on the principle of air displacement. At the heart of each Microlab 300 Series Pipettor is a precision stepper-drive motor combined with our uniquely designed Gastight syringes. The result is a precise and accurate instrument that is easy to set up and operate.

Proper handling and maintenance of your new Microlab 300 will increase the lifespan of the instrument. To learn about proper care and maintenance of your investment, please read this entire manual, including the warranty information.

Hamilton Company thanks you for purchasing the Microlab 300 Series Pipettor.

Intended Use

This manual applies to both the Microlab 300 and the Microlab 300 IVD products. The Microlab 300 is a hand-operated bench top device designed for precision liquid handling. The unit is intended for indoor laboratory use by authorized technical staff. The unit is also intended for manufacturing purposes with an emphasis on reproducibility through pre-prescribed run-only methods.

Conventions Used in this Manual

Throughout this manual symbols are used to represent various kinds of information.

WARNING! Information that is essential for avoiding personal injury is flagged with the International Warning Symbol.

Biohazard: Information that alerts the operator to situations where special care is required to remain protected from chemical or biochemical hazards.

Important! Information that is essential for avoiding damage to equipment.

Note: Interesting information or information that can help improve system performance.

CHAPTER 1:
Introduction

This chapter provides a brief overview of the Microlab 300 Series Pipettor including the following discussions:

1.1 Introduction of the Microlab 300 Series Pipettor

1.2 Safety Precautions

1.1 Introduction of the Microlab 300 Series Pipettor

The Microlab 300 is a precision liquid handling device designed to pipette volumes of liquid from 0.5 to 1,000 µL. The system's syringes and valve work together to aspirate and dispense fluid according to the air displacement principle, while the single pipette probe uses ClickSure™ tip technology to ensure a tight seal for optimal pipetting results. Finally, the Microlab 300 is controlled by a large touchscreen interface which guides users step-by-step through complete pipetting protocols. This instrument comes complete with the Syringe Drive Unit, Controller, SD card, valve, syringes, tubing, hand probe and Cable Management System. Chapter 2 will discuss the proper installation of Microlab 300 Series Pipettor components.

Note: The ambient temperature of the instrument location should continuously remain below 35 °C (95 °F).

1.2 Safety Precautions

For proper handling and care of the Microlab 300, it is essential that operating and service personnel follow general safety procedures and safety instructions described in this manual. Service maintenance must be performed only by authorized service technicians. Hamilton Company strongly recommends reading this information before proceeding with the remaining chapters in this manual.

1.2.1 General Safety Information

The Microlab 300 should be placed in a location where personnel have easy access to the front, back and sides for ease of operation and maintenance. Before operating the instrument, determine the amount of space needed for efficient and safe operation of the Microlab 300. Choose an area that is clean, dry, level and away from hazardous chemicals, radiation and hazardous biological substances. Also, the area should be free from corrosives. Leave enough space around the unit for ventilation. Avoid placing the instrument near other instruments or objects that could inhibit or stop air flow, or otherwise cause overheating of the electronics. Cleaning, dismantling and performing maintenance on the Microlab 300 should be performed only by properly trained personnel who know how to avoid possible dangers. Only certified repair technicians are authorized to perform mechanical maintenance on the Microlab 300.

When transporting the Microlab 300 for repair or shipment, it should be properly packaged inside the original shipping container. All Microlab 300 instruments returned to Hamilton Company for repair must be decontaminated before packaged for shipping.

Only the original approved parts and accessories may be used with the Microlab 300. Any alterations or modifications to the instrument may be dangerous and will void the warranty.

1.2.2 Operating the Microlab 300 Series Pipettor

When using the Microlab 300, Good Laboratory Practices (GLP) should be observed. During the operation of a Microlab 300, remain clear of moving parts. Never try to remove valves, syringes or tubing when the Microlab 300 syringe drive mechanism is moving. Never move the Microlab 300 while it is in operation.

If a spill occurs, power off the instrument and wipe it down with the appropriate disinfectant or chemical cleaner. Remember to analyze the aspects of the spill to determine what safety precautions should be followed to prevent future spills.

☆ **Important!** There are openings at the bottom of the syringes on the front of the Syringe Drive Unit. Prevent fluid from entering through these holes as this could damage the internal system electronics.

1.2.3 Electrical

The Microlab 300 must be turned off and disconnected from the power source when removing any mechanical or electrical components.

☆ **Important!** The power supply provided with the Microlab 300 is the only power source approved for connecting to the instrument. Unapproved power supplies can cause overheating, burning, melting and short-circuiting of the device. The use of so-called “substitute” or “alternative” power supplies is prohibited. Also, ensure the power source is plugged into a power outlet having the voltage and frequency that matches the power supply input requirements.

Check to ensure the appropriate power cord for your country was received. (See Appendix B for appropriate power cords.) Only connect the Microlab 300 power supply to a grounded outlet.

Charge the Controller overnight prior to use. Ensure the temperature of the Controller charging location remains below 35 °C (95 °F).

Avoid damaging the power cord while operating the instrument. Do not bend it excessively, step on it or place heavy objects on the power cord. A damaged power cord can easily become a shock or fire hazard. **Never use a damaged power cord.**

1.2.4 Biohazard

If the Microlab 300 becomes contaminated with a biohazardous or chemical material, it should be cleaned in accordance with the maintenance procedures. See Chapter 11, Care and Maintenance Section 11.5. Observe and perform the given maintenance procedures. Failure to do so may impair the reliability and correct functioning of the Microlab 300.

If working with biohazardous samples, observe and perform the maintenance procedures with a focus on cleaning and decontamination. Wear gloves when handling the instrument and components. Avoid touching tips discarded into waste container. Any surfaces on which liquid is spilled must be decontaminated.

If working with biohazardous or chemical materials, the user must not touch them.

⚠ **Biohazard:** Material used with the Microlab 300 may be considered biohazardous. Dispose of hazardous or biologically contaminated materials according to the practices of your organization. Discard all materials in a safe and acceptable manner and in compliance with all federal, local, regulatory and jurisdictional requirements. Always observe Good Laboratory Practices (GLP). Wear suitable protective clothing, safety glass and protective gloves, particularly when handling biohazardous samples and when dealing with spilled liquids and contaminated areas of the instrument. Avoid touching tips discarded into the laboratory-supplied waste bin. Any surfaces on which liquid is spilled must be decontaminated.

1.2.5 Protective Equipment

It is the user's responsibility to know and understand the level of protective equipment that must be worn when working with radioactive, biohazardous and harsh chemicals. When using the Microlab 300 wear personal protective apparel, including disposable gloves. Thoroughly wash hands after removing gloves, and dispose of gloves as biohazardous waste. Do not put your hands or face near the syringe drive mechanism while the instrument is running.

CHAPTER 2:
Instrument Setup

This chapter provides detailed information on the installation of the Microlab 300 hardware including:

2.1 Overview of Microlab 300 Parts List

2.2 Describing Instrument Components

2.3 Selecting the Proper Location

2.4 Charging the Controller

2.5 Installing the Controller and Syringe Drive Unit

2.6 Installing the Cable Management System

2.7 Installing the Disposable Tip Hand Probe

2.8 Installing the Fill and Probe Tubing

2.9 Applying Power to the Instrument

2.10 Priming the Instrument

2.11 Using the ClickSure™ Tips

2.12 Installing the Printer (Optional)

2.1 Overview of Microlab 300 Parts List

The Microlab 300 instrument comes with everything needed for installation. For replacement parts, please refer to Appendix B Replacement Parts and Accessories.

Carefully unpack the Microlab 300 components and verify that all parts have been received. The parts list for the instrument is displayed in the table below.

Table 2-1 Microlab 300 Parts List

Component	Part Number	Quantity
Microlab 300 User Manual	67258-01	1
Hardware Quick Start Guide	67273-01	1
Software Quick Reference Card	67274-01	1
Syringe Drive Unit Includes valve, 1.25 mL syringe, and 25 µL syringe pre-installed	66260-01	1
Controller Includes Controller cable and SD card	65800-01	1
Disposable Tip Hand Probe Includes instruction sheet	63960-01	1
Cable Management System Includes instruction sheet, Accessory Holder, Cable Manager, and Probe Holder	65160-01	1
12 gauge fill tubing	61614-01	1
Power supply	61092-01	1
Power cord[1]	Reference Appendix B	1

1 – This is a country specific power cord. Reference Appendix B for the appropriate part number.

2.2 Describing Instrument Components

This section shows detailed diagrams of the front and back of the Microlab 300 Syringe Drive Unit and Controller. It also provides a description of the buttons and port receptacles required to install and operate the Microlab 300 Pipettor as described in following chapters.

2.2.1 Description of the Front View of the Syringe Drive Unit

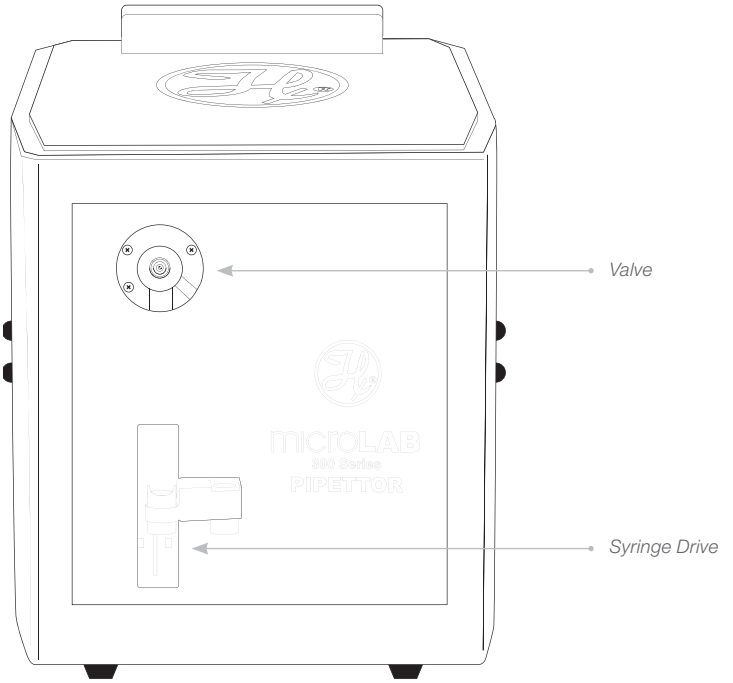


Figure 2-1: Front View of the Microlab 300 Syringe Drive Unit

Valve Actuator

The valve actuator turns the valve automatically to aspirate and dispense liquids. Valve direction is dependent on the volume being aspirated or dispensed.

Syringe Drive

The syringe drive mechanism positions the Hamilton precision syringes with the high-resolution stepper motor. The syringes are threaded into the valve and the plunger is attached to the syringe drive with a thumbscrew. The syringe drive moves up and down to dispense and aspirate fluid accordingly.

2.2.2 Description of the Rear View of the Syringe Drive Unit

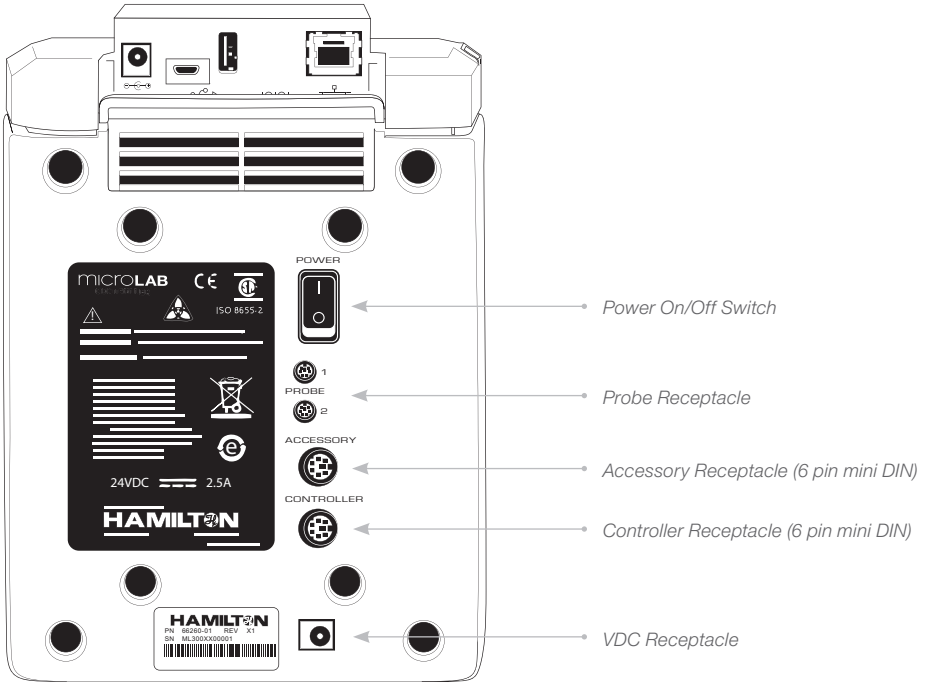


Figure 2-2: Accessory Receptacle and Controller Receptacle

Power on/off (I/O) Switch

The Power on/off switch is located in the upper right corner on the back of the Syringe Drive Unit. The switch toggles on or off (I = on, O = off).

Probe Receptacles

There are two probe receptacles located on the back of the instrument under the Power switch. The Disposable Tip Hand Probe may be inserted into either receptacle. When a signal is received by the Syringe Drive Unit through the probe receptacle, the syringe drive moves to perform the next action in the current method.

Accessory Receptacle (6 pin mini DIN)

This port will be used for future expansion of the system.

Controller Receptacle (6 pin mini DIN)

The Controller receptacle is located in the lower right corner on the back of the Syringe Drive Unit. This port is used to connect the Controller to the Syringe Drive Unit using the grey Controller cable.

VDC Receptacle

The VDC receptacle is located in the lower right corner on the back of the Syringe Drive Unit. The port is used to connect the power cord to the Microlab 300 system.

2.2.3 Description of the Rear View of the Controller

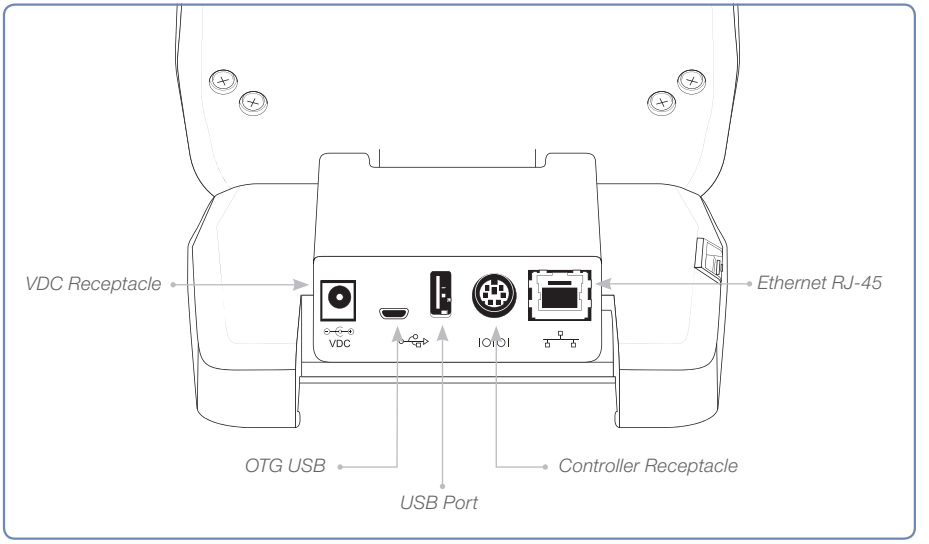


Figure 2-3: Rear View of the Controller

VDC Receptacle

The VDC receptacle is located on the back of the Controller. This port is used for charging the Controller. It is only used when the Controller is not attached to the Microlab 300 Syringe Drive Unit.

Note: A Controller power supply is not shipped with the Microlab 300 because the Controller receives power through the Controller receptacle when connected to a powered Syringe Drive Unit.

OTG USB Port

The OTG USB port is located on the back of the Controller. This port is used for diagnostics and testing at Hamilton Company prior to shipment.

USB Port

The USB port is located on the back of the Controller. This port is used for connecting the Microlab 300 to the Printer Kit (p/n 61500-04).

Controller Receptacle

This port is located on the back of the Controller. This port is used for connecting the Controller to the Syringe Drive Unit, from which it receives input power.

Ethernet RJ-45

The Ethernet receptacle is located on the back of the Controller. This port will be used for future expansion of the system.

2.3 Selecting the Proper Location

When selecting a location for your Microlab 300, choose an area that is clean, dry, level and away from hazardous chemicals, radiation and/or hazardous biological substances. Leave enough space around the unit for ventilation. Make sure there is a power source nearby to connect the power cord.

2.4 Charging the Controller

Upon receiving a system, it is recommended to charge the Controller.

Step 1. Connect the provided power cord to the power supply unit.

Step 2. Plug the power cord into a wall outlet.

Step 3. Insert the power supply into the Controller VDC receptacle. The Controller powers up and displays the Main Menu.

Charge the Controller overnight prior to use. Ensure the temperature of the Controller charging location remains below 35 °C (95 °F).

2.5 Installing the Controller and Syringe Drive Unit

The Syringe Drive Unit is the core of the Microlab 300 Series Pipettor. It contains a precision drive motor, the syringe drive mechanism, the valve assembly, the power button and all cable receptacles. The Controller contains the software necessary to communicate user inputs on the touchscreen, like volume, to the Syringe Drive Unit, resulting in precision pipetting. This section describes the installation of the Controller and Syringe Drive Unit.

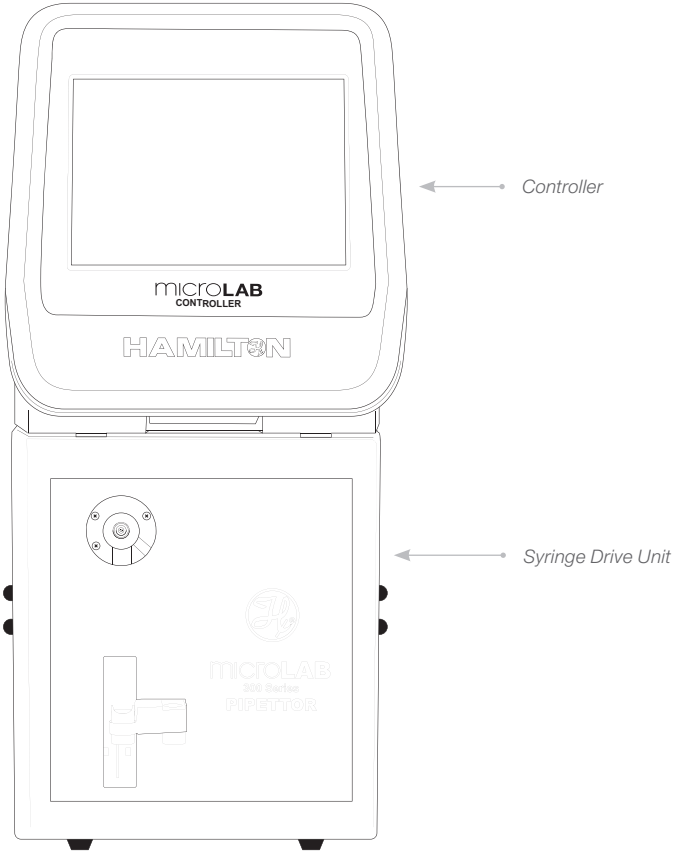


Figure 2-4: Assembly of Controller and Syringe Drive Unit

Step 1. Place the Syringe Drive Unit in the selected location.

Step 2. Place the Controller on top of the Syringe Drive Unit as shown in Figure 2-4.

☆ **Important!** The controller should be charged for 12 hours prior to use (see Section 2.4).

Step 3. Next, plug one end of the grey Controller cable into the Controller receptacle on the back of the Controller and the other end of the cable into the Controller receptacle on the back of the Syringe Drive Unit.

Step 4. Finally, insert the SD card label-side up into the left-side of the Controller.

The Controller is now properly installed on the unit.

As shown below, the Controller can tilt at different angles for user comfort and preference; in addition, this Controller may also be hung on a wall.

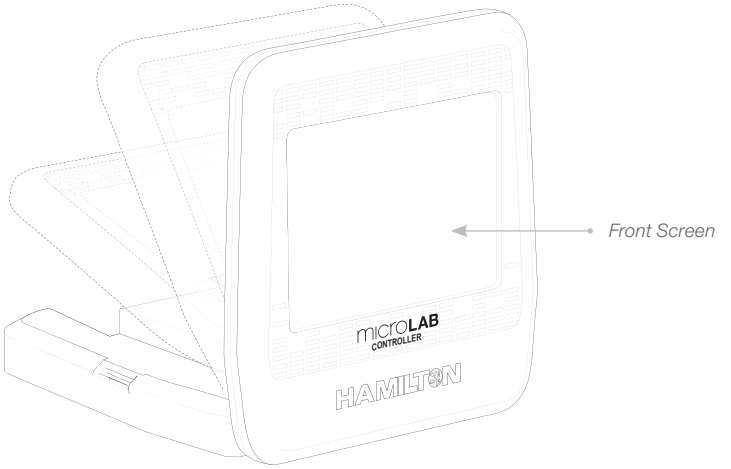


Figure 2-5: Controller

2.6 Installing the Cable Management System

The Cable Management System is designed to hold the Disposable Tip Hand Probe. Included with the Cable Management System is a Cable Manager that eliminates unnecessary cord clutter on the workstation. The unit comes with three pieces that are easily assembled: the Accessory Holder, the Cable Manager and the Probe Holder as shown in Figure 2-6.

Step 1. Determine on which side of the pump to install the Cable Management System. Remove the two plastic screws and carefully install the Accessory Holder with the metal screws and washers as shown in Figure 2-7. Hand-tighten each screw until snug.

Step 2. Loosen the metal thumbscrew on the end of the Accessory Holder. Then, thread the metal rod through the hole and tighten the thumbscrew as shown in Figure 2-7.

Step 3. Attach the Probe Holder by loosening the thumbscrew. Position onto the metal rod and tighten as shown in Figure 2-8.

Step 4. Attach the Cable Manager onto the metal rod as shown in Figure 2-9.

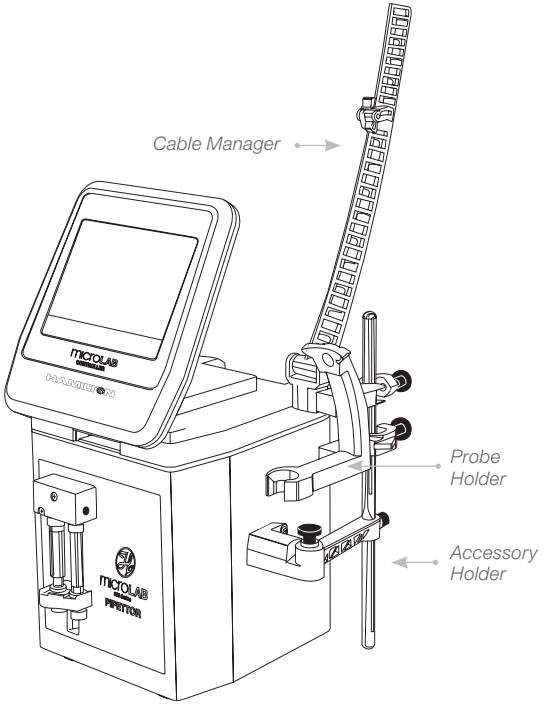


Figure 2-6: Cable Management System

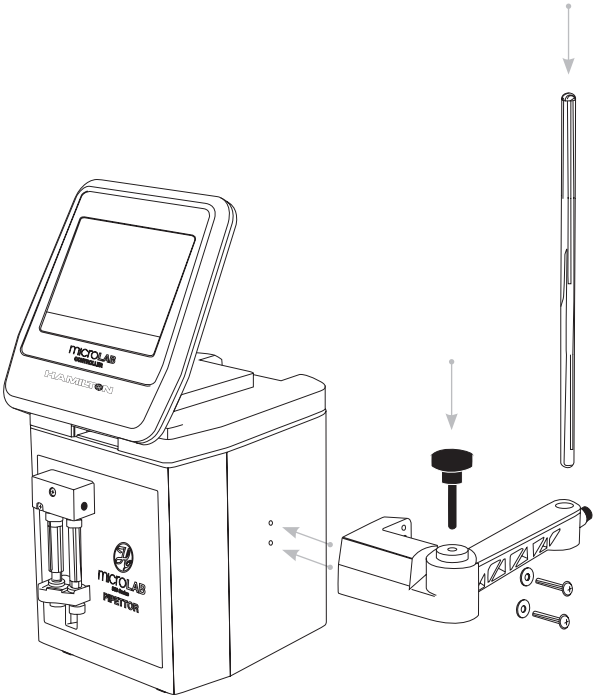


Figure 2-7: Assembly of the Accessory Holder

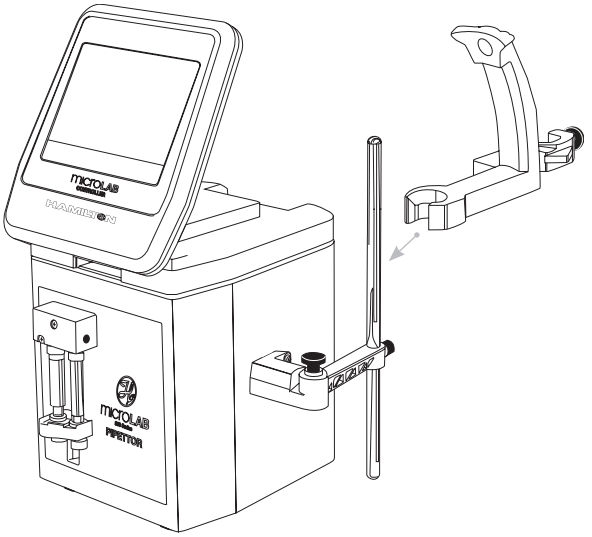


Figure 2-8: Assembly of the Probe Holder

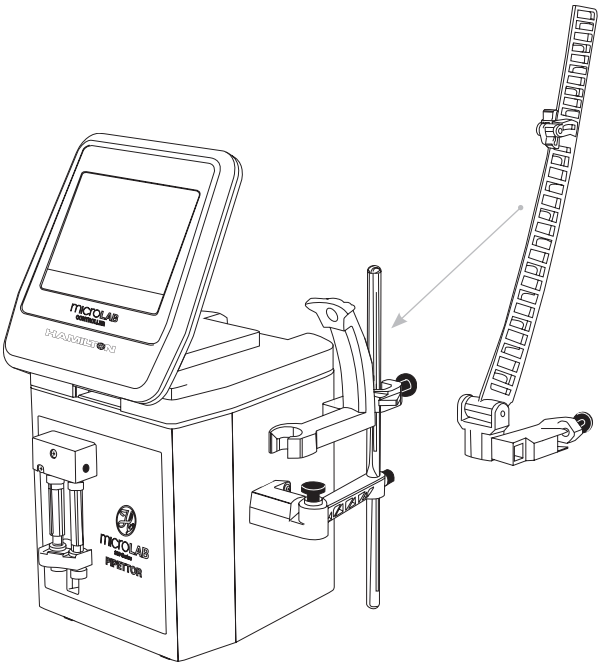


Figure 2-9: Assembly of the Cable Manager

The Cable Management System is now properly installed on the instrument.

2.7 Installing the Disposable Tip Hand Probe

Step 1. Plug the probe cable into one of the two probe receptacles on the rear of the Syringe Drive Unit.

Step 2. Thread the tubing and probe cable through the Cable Manager starting after the third tubing clip. Weave under each tab as shown in Figure 2-10.

Note: The Disposable Tip Hand Probe comes with the tubing pre-installed. Instructions for installing this tubing on the Microlab 300 are located in Section 2.8. Instructions for replacing the tubing are located in Section 11.7.3.

⚠ **WARNING!** Keep fingers away from hinged openings to prevent pinching of fingers.

Step 3. Set the Disposable Tip Hand Probe in the Probe Holder as shown in Figure 2-11.

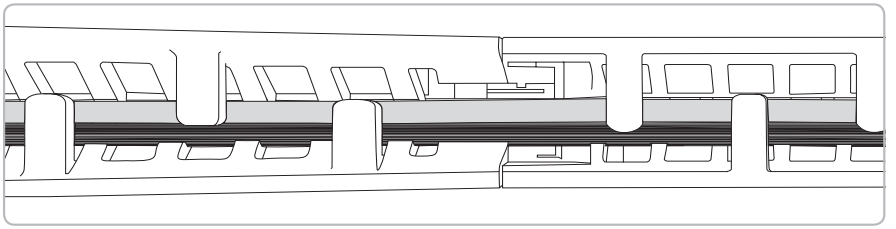


Figure 2-10: Threading the tubing and cables through the Cable Manager

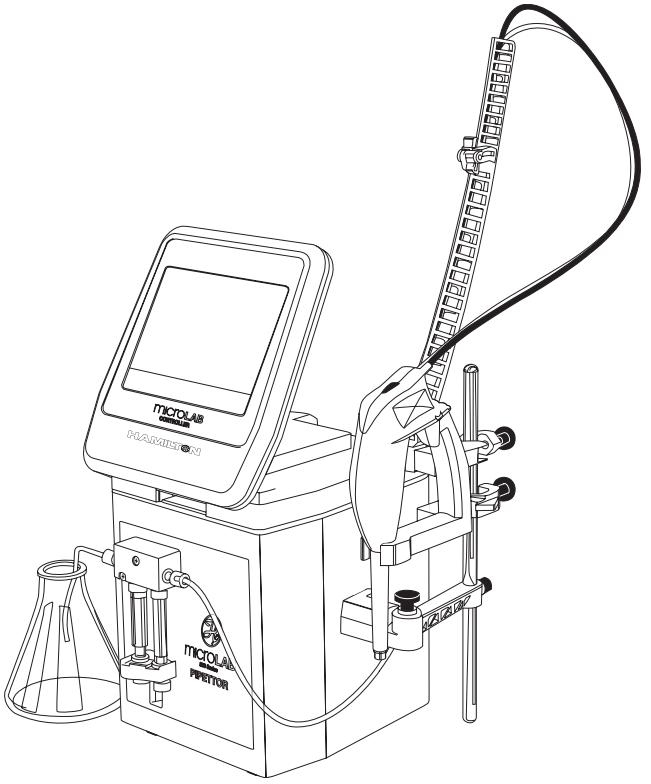


Figure 2-11: Assembly of the Disposable Tip Hand Probe

Note: The entire Cable Management System can be adjusted to the desired position or height of the user. Users may also use a standard ring stand, rather than the metal rod provided, to accommodate the Cable Management System as well as other ring-stand accessories.

2.8 Installing the Fill and Probe Tubing

The Microlab 300 Series Pipettor uses 12 gauge tubing for pipetting applications. The tubing comes in two different types: fill tubing and probe tubing. The fill tubing has a blunt end that is designed to go into a reservoir of liquid. The probe tubing is preinstalled in the Disposable Tip Hand Probe. Instructions for replacing the probe tubing are found in Section 11.7.3.

Step 1. Before installing the tubing, pre-wet both tubing fittings with deionized water.

Step 2. Make sure the tubing is free of crimps or blockages. Crimping or blocking within the tubing may cause leaks or air bubbles. If the tubing is damaged, do not use it and replace with new tubing.

Step 3. Insert the fill tubing fitting in the left port on the valve and turn clockwise to tighten as shown in Figure 2-12.

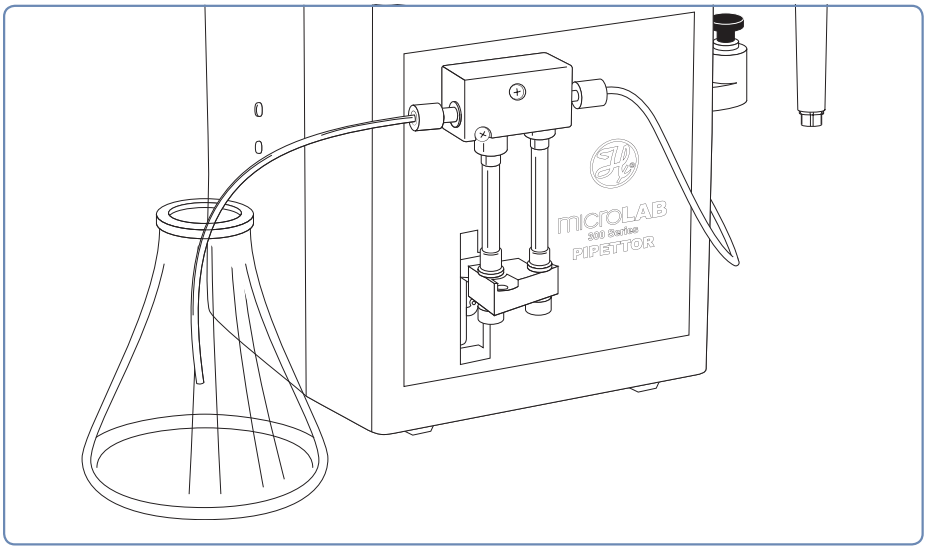


Figure 2-12: Assembly of Fill and Probe Tubing

Step 4. Place the blunt end of the fill tubing in an appropriate reservoir filled with deionized water. Cover the reservoir with an appropriate cap or Parafilm® to prevent contamination of system fluid.

Note: The fill tubing can be shortened by cutting it to meet specific customer needs.

Step 5. Insert the probe tubing in the right port on the valve and turn clockwise to tighten.

⚠ **WARNING!** Keep fingers away from syringe drive and from between syringe plunger and bottom of syringe barrel to prevent pinching of fingers.

Congratulations, you have successfully completed the hardware installation of the Microlab 300 Series Pipettor.

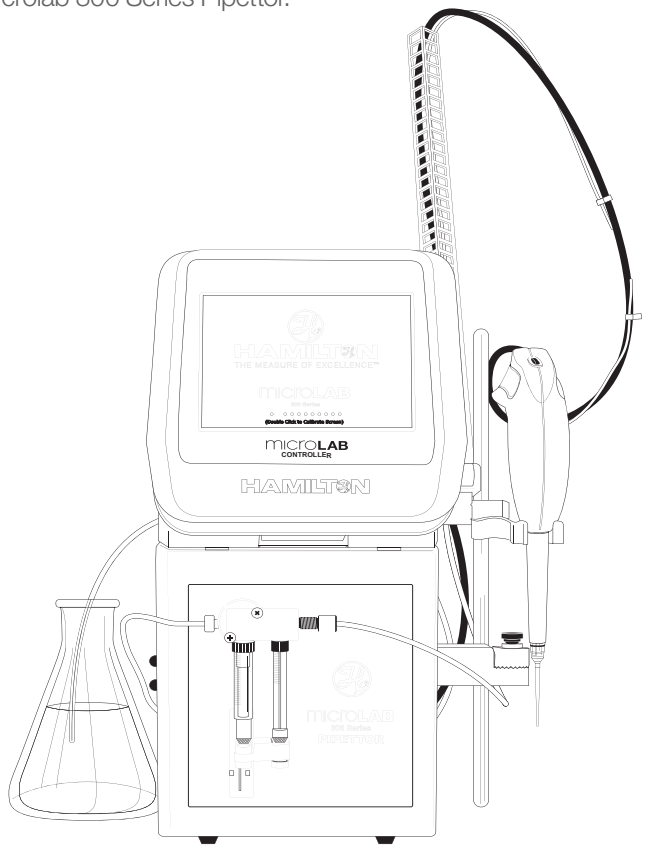


Figure 2-13: Final Assembly of the Microlab 300 Series Pipettor

Note: With all components installed, the device becomes slightly top heavy. Use caution when operating and avoid bumping and pushing the unit to prevent knocking it over.

2.9 Applying Power to the Instrument

The Controller is powered via the connection to the Syringe Drive Unit.

Step 1. To power up the instrument, plug the country-specific power cord into the power supply.

Step 2. Make sure the Syringe Drive Unit Power switch is set to the O (off) position. Then plug the power supply into the VDC receptacle on the Syringe Drive Unit and plug the power cord into a wall outlet as shown in Figure 2-14.

Step 3. Flip the Power switch on the Syringe Drive Unit upwards to the I (on) position. It takes approximately one minute for the Controller to boot up completely.

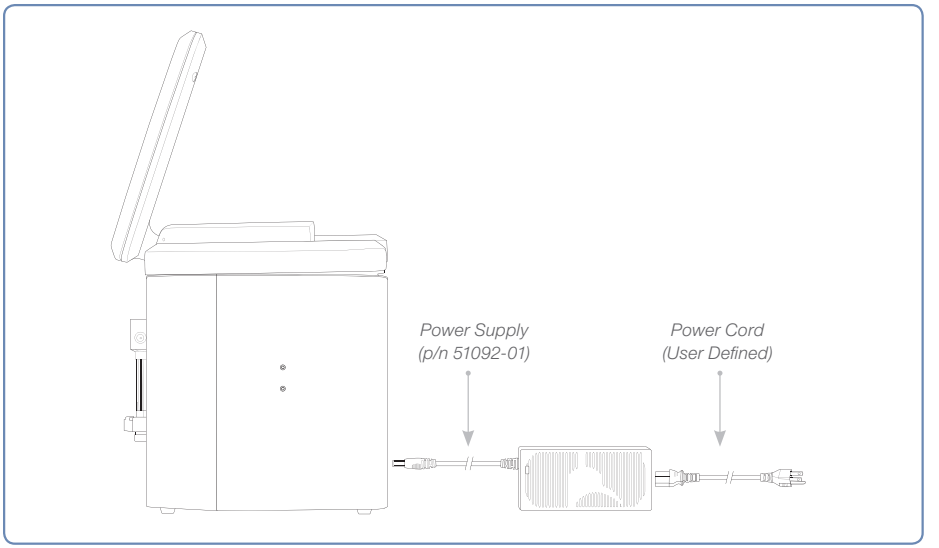


Figure 2-14: Power Cord and Power Supply Installation

2.10 Priming the Instrument

This section will describe how to properly prime the Microlab 300 before running a method.

Step 1. Select the Prime button on the Controller Main Menu screen.

Step 2. Select the appropriate number of cycles and press the Run button. One cycle consists of one complete syringe aspiration and a complete dispense. The recommended number of prime cycles is 10.

Step 3. Continue priming until there is no air present in the fluid path.

☆ **Important!** If air bubbles are still present after several priming cycles, verify that all syringe and tubing connections are secure and repeat the priming until the air is purged from the system.

2.11 Using the ClickSure™ Tips

The Microlab 300 uses disposable tips for liquid handling. The system is optimized using validated ClickSure disposable pipette tips which are available in different sizes, purities and with or without a filter.

The Microlab 300 is only functional if a ClickSure tip has been attached. You can either attach the pipette tip by hand or directly insert the end of the probe into a tip held in the tip packaging box. If attaching a pipette tip by hand, it must be handled in such a way to avoid contamination and heating of the tip.

Load the ClickSure tip by applying light pressure. A tip is properly loaded when an audible “click” is heard and the O-ring sits comfortably within the O-ring groove of the ClickSure tip.

☆ **Important!** To preserve tips for future use, the tip package can be resealed by pressing the adhesive lid back onto the tip box.

2.12 Installing the Printer (Optional)

The printer upgrade kit that is compatible with the Microlab 300 is part number 61500-04. The printer upgrade kit contains an HP printer and an additional accessories box. Components required for connecting the printer to the Microlab 300 include black and color inkjet cartridges, a USB cable, a power supply and a country-specific power cord. All other components in the HP printer box are NOT required to connect to the Microlab 300.

Step 1. Power off the Microlab 300.

Step 2. Insert of end of the USB cable into the USB port on the back of the Controller as shown in Figure 2-15.

Step 3. Insert the other end of the USB cable into the printer connection port.

Step 4. Connect the power supply to the printer.

Step 5. Connect the power cord to the power supply.

Step 6. Plug the power cord into a wall outlet. The Microlab 300 is now connected to the printer.

Step 7. Power the Microlab 300 on and then power the printer on.

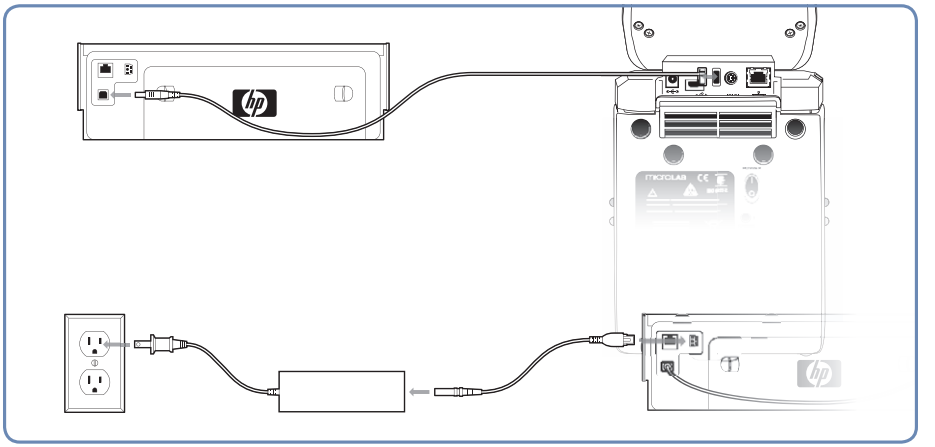


Figure 2-15: Installation of the Printer

CHAPTER 3:

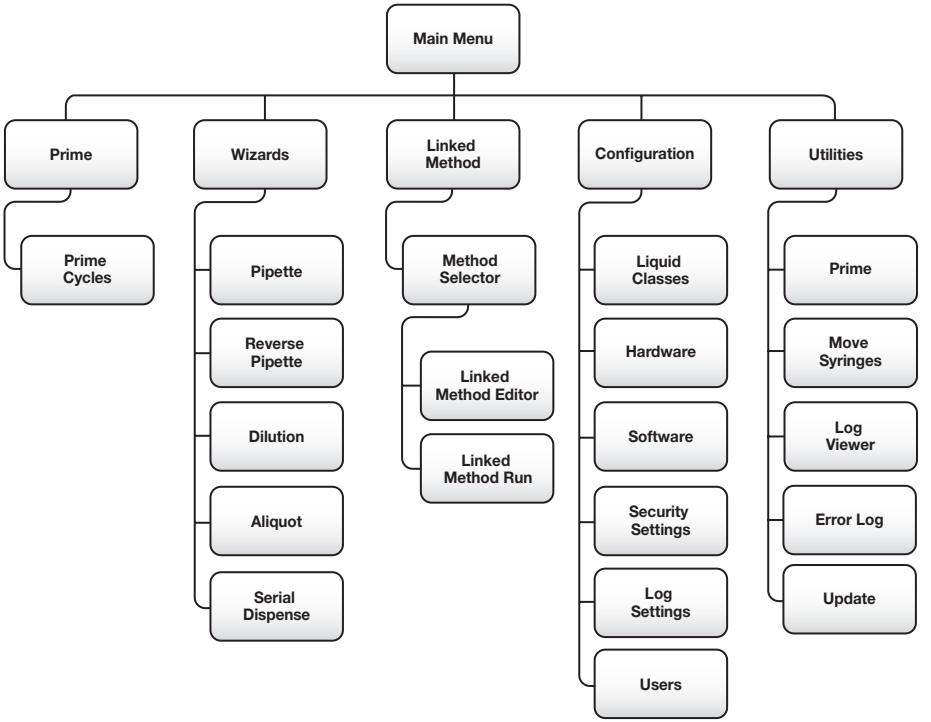
Introducing the Microlab 300 Software

The Microlab 300 Series Pipettor comes with user-friendly software, allowing users to easily create, save and execute complete pipetting protocols. This chapter provides an overview of the user interface such that a user can navigate the screens.

3.1 User Interface Flow Chart

3.1 User Interface Flow Chart

The flowchart below shows the interrelationship among the major screens in the Microlab 300 Series Pipettor user interface. The Main Menu screen provides access to all other screens within the user interface. Press the Icon buttons on the Main Menu screen to navigate through the interface. Press the Back button to return to the previous screen.



CHAPTER 4:

Disposable Tip Hand Probe Configuration and Operation

This chapter discusses details on the Disposable Tip Hand Probe and will cover the following topics:

4.1 Configuring the Disposable Tip Hand Probe

4.2 Operating the Disposable Tip Hand Probe

4.1 Configuring the Disposable Tip Hand Probe

The probe buttons can be set for right-handed or left-handed use within the Configuration menu of the Microlab 300 Controller.

Step 1. Select Configuration from the Main Menu screen.

Step 2. From the Configuration screen, select Hardware.

Step 3. Choose whether the probe will be used in the right- or left-hand mode.

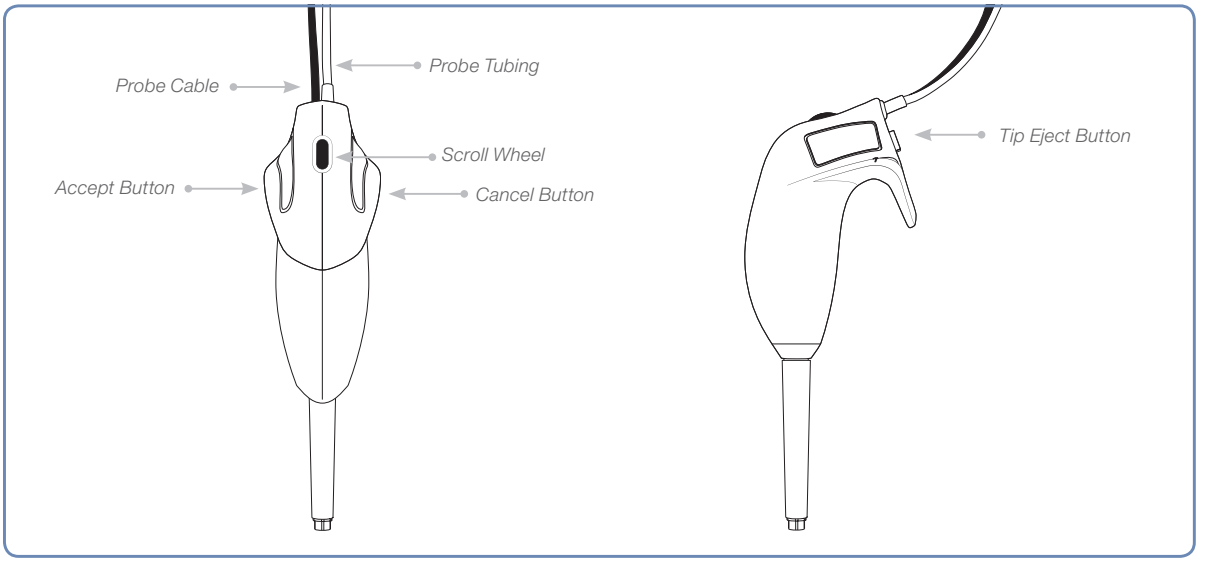


Figure 4-1: Disposable Tip Hand Probe buttons (right handed)

4.2 Operating the Disposable Tip Hand Probe

The Disposable Tip Hand Probe is held differently than a traditional pipette. Reference Figure 4-2 for instructions on how to properly hold the hand probe.

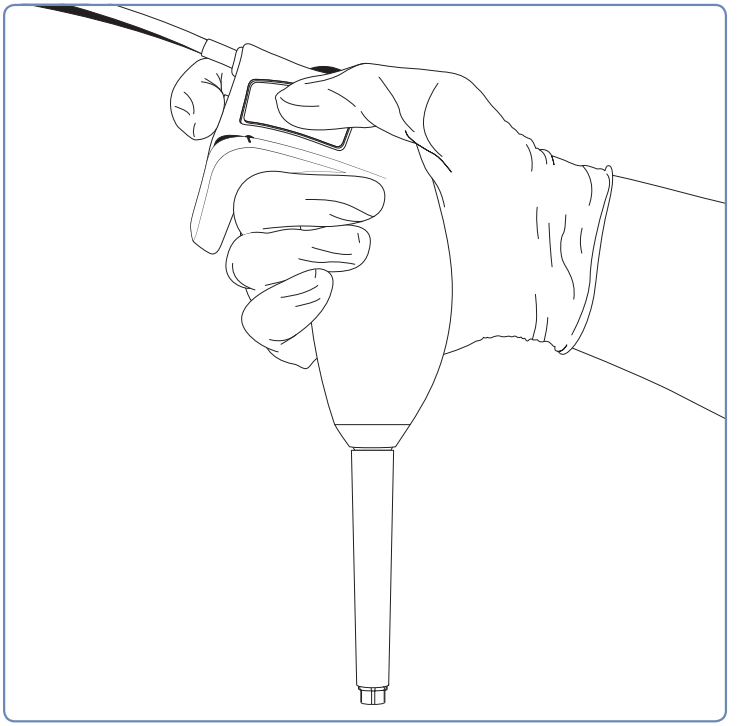


Figure 4-2 Holding the Disposable Tip Hand Probe

Accept button

Located next to the thumb; used to activate pipetting functions and to choose OK from pop-up screens.

Cancel button

Located on the opposite side of the Accept button; used to activate Empty Tip function or to choose Cancel from pop-up screens.

Scroll button

Located top center of the probe; used to access method Favorites and to select items from a list box.

Tip Eject button

Located near the index finger; used to eject ClickSure tip.

Note: For tips on cleaning the Disposable Tip Hand Probe, reference Section 11.5.4.

Biohazard: When using the Microlab 300, always observe Good Laboratory Practices (GLP). Wear suitable protective clothing, safety glasses and protective gloves, particularly when handling biohazardous samples and when dealing with spilled liquids and contaminated areas of the instrument. Avoid touching tips discarded into the laboratory-supplied waste bin. Any surfaces on which liquid is spilled must be decontaminated.

CHAPTER 5:
Configuration Menu

This chapter describes how to configure the instrument including the following topics:

5.1 Overview of Screen Terminology
5.2 Liquid Classes
5.3 Hardware Configuration
5.4 Software Configuration
5.5 Security Settings
5.6 Log Settings
5.7 User Accounts

5.1 Overview of Screen Terminology

This section describes the features of the eight major screen types used throughout the user interface.

5.1.1 Icon Screens

5.1.2 Run Screens

5.1.3 Data Entry Screens

5.1.4 Pop-up Control

5.1.5 Pick List

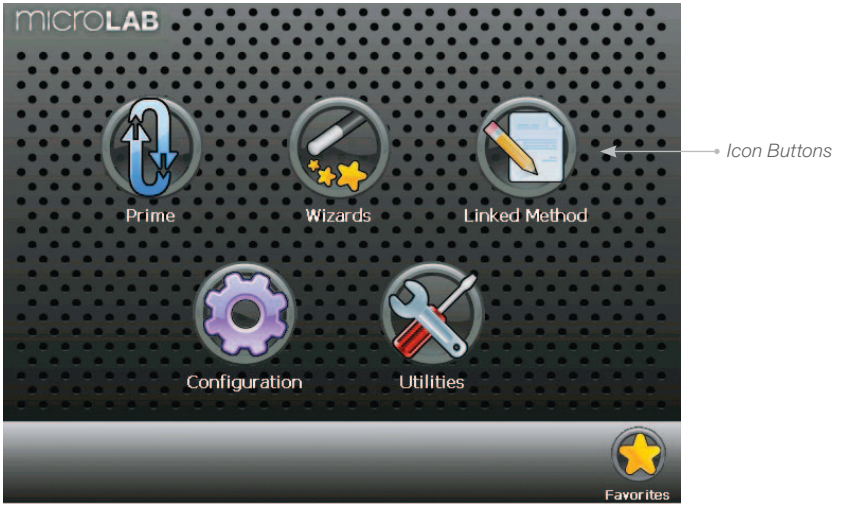
5.1.6 Linked Method Screens

5.1.7 Numeric Keypad

5.1.8 Alphanumeric Keypad

5.1.1 Icon Screens

The icon screens allow basic navigation through the user interface. General screens like the Main Menu or Wizard menu commonly use this screen to display all possible navigation options.



Icon Buttons

These buttons allow major navigation among functions within the user interface.

Back Button

Pressing this button in the lower-left of the screen displays the previous screen.

Small Icon Buttons

These buttons at the bottom of each screen provide additional functionality to change values on the current icon screen.

5.1.2 Run Screens

These screens enable control and monitoring of all aspects of the pipettor's activities. Buttons and icons are used to change parameters, and indicators are designed to give current and future system status.

Parameters Adjustment Buttons

These buttons show the current dispense setting. The exact function for these buttons are defined in greater detail in the Wizards and Linked Method sections of this manual.

Parameter Indicator

This indicator shows the value of a parameter but does not allow for the adjustment of the parameter.

Back Button

Pressing this button in the lower-left of the screen displays the previous screen.

ClickSure Tip Volume Indicator

This indicator shows the current volume of solution in the ClickSure tip.

Small Icon Buttons

These buttons provide additional functionality to the Run screen. The exact function for these buttons is defined in greater detail in the Wizards and Linked Method sections of this manual.

Fluid Direction Indicator

This indicator shows the direction of fluid movement in or out of the ClickSure tip in the next step.

5.1.3 Data Entry Screens

Data Entry screens allow the inputting of values for several parameters. The values that can be changed are displayed in a table format. Editing a value is enabled when the selected row is highlighted.

5.1.4 Pop-up Control

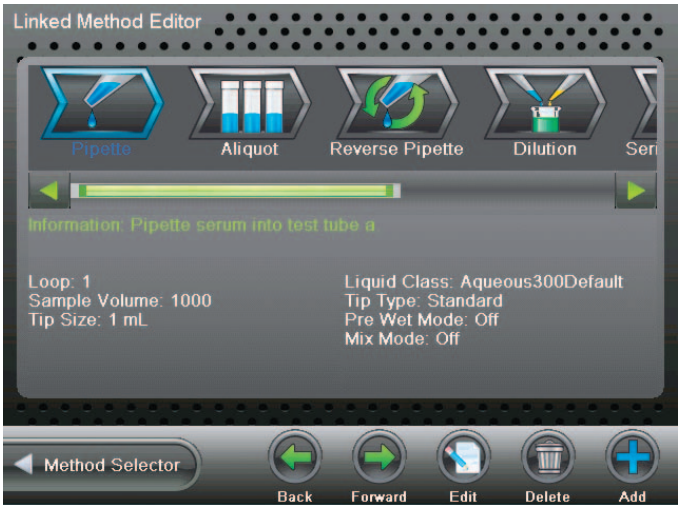
The Pop-up Control appears as a modal window within the current screen. All buttons outside of the modal window will be disabled until the “OK” button is pressed to close the modal.

5.1.5 Pick List

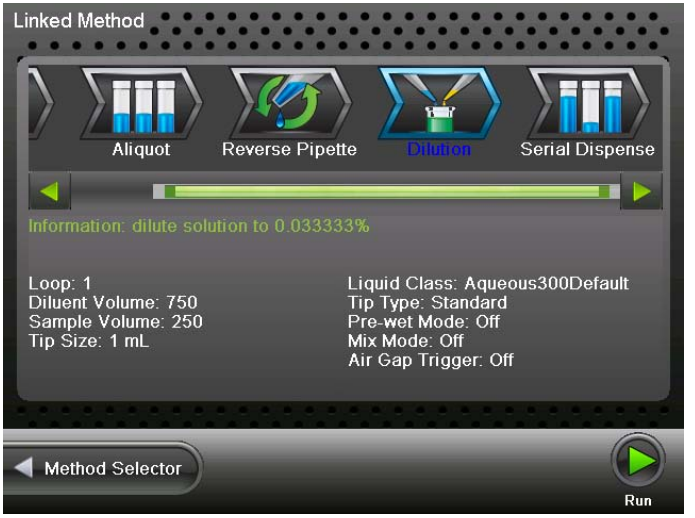
The Pick List screen allows the user to select from a list of options. Options can include a choice of settings or applications to activate. All buttons outside of the Pick List screen remain disabled until the “Accept” or “Cancel” button is pressed to close the screen.

5.1.6 Linked Method Screens

There are two main screens in the Linked Method. The first screen is the Linked Method Editor. This screen allows the user to add and delete different Wizards and steps in a Linked Method.

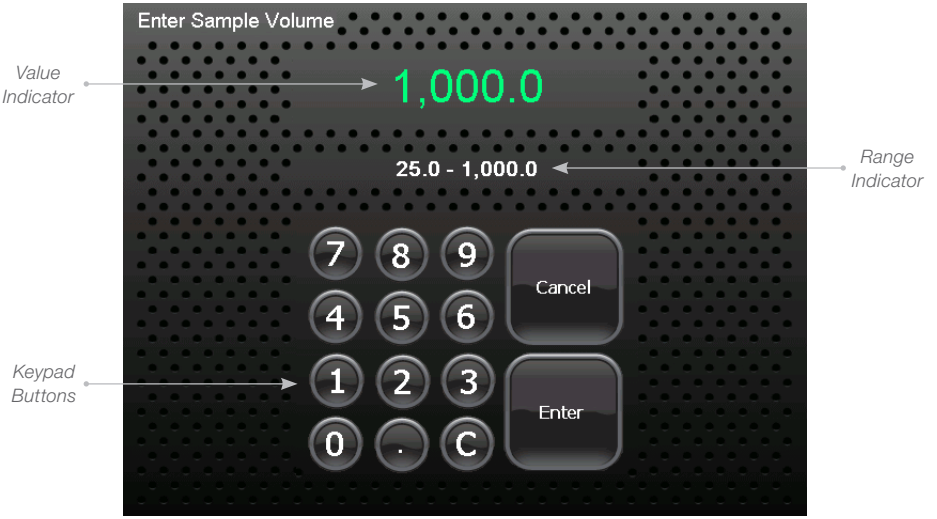


The second screen is the Linked Method Run screen. This screen displays the different applications within the Linked Method that are run throughout the method.



5.1.7 Numeric Keypad

This screen appears when changing a numeric value. The screen initially displays the current parameter value. Pressing a keypad button automatically clears the current value.



Value Indicator

This indicator displays the current value that will be stored when the Enter button is pressed.

Keypad Buttons

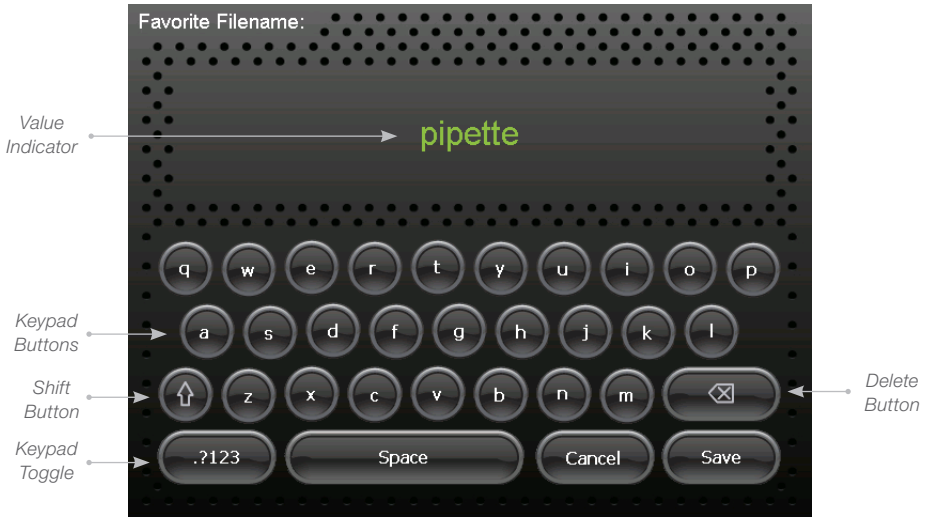
These buttons are used to add and clear numbers from the Value Indicator.

Range Indicator

For most parameters only specific values are acceptable. The Range Indicator displays the valid values for the parameter that is currently selected. If a value is entered outside of that range the font color will turn red until an allowed value is entered.

5.1.8 Alphanumeric Keypad

This screen appears when changing an alphanumeric value. The screen initially displays the current parameter value. Pressing a keypad button automatically clears the current value.



Value Indicator

This indicator displays the current value that will be stored when the Save button is pressed.

Keypad Buttons

These buttons are used to add or clear the numbers or characters from the Value Indicator.

Shift Button

This button toggles the letters from lower case to upper case.

Keypad Toggle

This toggles the keypad between letters and numbers.

Delete Button

This removes one character at a time from the Value Indicator.

5.2 Liquid Classes

The Microlab 300 instrument allows for the use and creation of Liquid Classes. Liquid Classes are designed to compensate for the liquid's density, viscosity, surface tension and/or vapor pressure to maintain accuracy and precision. In the software, users may use the Liquid Classes that come standard on the instrument or create unique Liquid Classes to get the best pipetting accuracy for the given liquid of choice.

This section describes Liquid Class parameters and how Liquid Classes can be used.

5.2.1 Liquid Class Parameters

5.2.2 Standard Liquid Classes

5.2.3 Creating Liquid Classes

5.2.4 Editing/Deleting Liquid Classes

5.2.5 Import/Export Liquid Classes

5.2.1 Liquid Class Parameters

Microlab 300 Liquid Classes include all parameters that a user may adjust to fine-tune pipetting accuracy. Changes in the Liquid Class will not affect the dispensing precision. Precision can be improved by replacing worn parts.

Liquid Class parameters include density, aspirate speeds, dispense speeds, post-aspiration delays, post-dispense delays, blow out delays and number of pre-wet cycles as described below.

Density

Defines the mass of the fluid per unit volume. Density is measured in g/mL.

Number of Replicates

Defines the number of times a particular volume will be pipetted and weighed during gravimetric calibration. The software will calculate the average mass from these replicates and use this average mass value and the density to adjust the data points of a Liquid Class curve.

Pre-Blowout Delay

Defines the amount of time the system waits after dispensing fluid and before dispensing the blowout.

Post-Blowout Delay

Defines the amount of time the system waits after dispensing the blowout and before re-aspirating the blowout volume in preparation for the next pipetting activity.

Aspirate Speed

Defines how quickly the fluid is aspirated. Slower speeds may be used for viscous and/or volatile fluids to prevent cavitation and/or boiling. Speed options include:

Fast: 7.5 µL/sec for volumes ≤15 µL, 300 µL/sec for volumes >15 µL

Recommended: 5 µL/sec for volumes ≤15 µL, 200 µL/sec for volumes >15 µL

Slow: 2.5 µL/sec for volumes ≤15 µL, 100 µL/sec for volumes >15 µL

Post-Aspirate Delay

Defines the amount of time the system waits after an aspiration to allow the system to reach mechanical and pressure equilibrium. The operator is expected to maintain the tip within the fluid during this time interval. Longer delays may be needed to adjust for faster aspirate speeds and/or more viscous fluids.

Dispense Speed

Defines how quickly the fluid is dispensed. Slower speeds may be used for viscous fluids to allow them to flow to the end of the tip increasing dispense accuracy. Speed options include:

Fast: 7.5 µL/sec for volumes ≤15 µL, 300 µL/sec for volumes >15 µL

Recommended: 5 µL/sec for volumes ≤15 µL, 200 µL/sec for volumes >15 µL

Slow: 2.5 µL/sec for volumes ≤15 µL, 100 µL/sec for volumes >15 µL

Post-Dispense Delay

Defines the amount of time the system waits after a dispense and before a subsequent dispense to allow the system to reach mechanical and pressure equilibrium. The operator is expected to maintain the tip in a proper dispensing position during this time interval. Longer delays may be needed to adjust for faster dispense speeds.

Post-Dispense Audible

If enabled, an audible buzzer will indicate that a dispense is complete.

Number of Pre-wet Cycles

The number of aspiration and dispense cycles that will occur prior to aspiration of the desired volume to wet the inside of the ClickSure tip.

The tip type and size used to create a Liquid Class are also important. Liquid Classes must be defined for each of the ClickSure tip sizes and types. The user must select which tip size and type (non-sterile, sterile or sterile/filtered) that is to be used and create a Liquid Class. For example, if a user uses only sterile/filtered tips but uses volumes across the volume range of 0.5 to 1,000 µL, the user must create two Liquid Classes, one for each tip size.

The Microlab 300 SD card can store hundreds of Liquid Class files. For archiving purposes Hamilton has provided a PC application available online called LyncStore. This application allows for management and archiving of Liquid Class files transferred from the SD card to a PC. From this PC application you can filter, archive and view Liquid Class files.

Learn more about the LyncStore at www.hamiltoncompany.com.

5.2.2 Standard Liquid Classes

The Microlab 300 offers three standard Liquid Classes for the user:

Default300Aqueous: Developed using deionized water per ISO-8655 standards

Default300Volatile: Developed using 99.5% isopropyl alcohol

Default300Viscous: Developed using 87 mg/mL Bovine Serum Albumin (BSA)

5.2.3 Creating Liquid Classes

Step 1. To create a new Liquid Class, enter the Configuration menu from the Main Menu screen. Then select Liquid Classes.

Step 2. Select one of the standard Liquid Classes that is closest to the properties of your liquid.

Step 3. Press the Duplicate button, name the new Liquid Class and press Save.

Note: Duplication will copy all of the pipetting parameters of the selected Liquid Class, including pipetting speeds, blowout properties, and aspiration or dispense delays, etc. It will also duplicate the points of calibration (volume and mass) used to create that liquid compensation curve. After duplicating a Liquid Class, Hamilton recommends checking all parameters and data points and modifying them accordingly.

Step 4. After the Liquid Class is created, press the Edit button next to the Liquid Class that was created. This will take the user to the Liquid Class settings screen.

Step 5. Enter the Liquid Density (g/mL) and Number of Replicate parameters by highlighting the parameter and inputting the appropriate value.

Step 6. Select the tip size and type that you want to modify by pressing the Edit button. Enter the appropriate values for the additional parameters. The additional parameters include Pre Blowout Delay, Post Blowout Delay, Aspiration Speed, Post Aspirate Delay, Dispense Speed, Post Dispense Delay, Post Dispense Audible and Number of Pre-wet Cycles. For details on these parameters, reference Section 5.2.1.

Note: If pipetting over the complete volume range of the Microlab 300 using a single tip type, it will be necessary to create two Liquid Classes, one for the 50 µL tip and one for the 1 mL tip.

Step 7. Once all parameter values have been entered, select the Data Points button in the lower right part of the screen. All data points will be pre-populated from the duplication of the original curve.

Step 8. Add or delete volume points using the icons at the bottom of the screen.

Note: In the data points screen there will be a high and low volume point for each tip size that cannot be modified. For example, the 50 µL tip has a high point of 50 µL and a low point of 1 µL. When creating the calibration curve it is recommended that these high and low volume points be used.

Step 9. Now, the system can be gravimetrically calibrated. Refer to Section 11.4 for instrument calibration.

5.2.4 Editing/Deleting Liquid Classes

To edit an existing Liquid Class, the file must be selected from the Liquid Classes Edit Classes screen. The user may edit the Liquid Class accordingly by following the instructions in Section 5.2.3 beginning at Step 4.

To delete a file, the user may select the file from the Liquid Classes Edit Classes screen and press the Delete button.

Note: The standard Liquid Classes Aqueous, Volatile and Viscous may not be deleted from the instrument or modified. They may be duplicated to create new Liquid Classes as described in Section 5.2.3.

5.2.5 Import/Export Liquid Classes

To import Liquid Classes from the SD card or to export Liquid Classes to the SD card, the user simply presses the Import or Export buttons on the Edit Classes page and then selects the files that need to be imported or exported. The imported files will propagate in the Liquid Classes screen. The exported files will be saved on the SD card. These can then be transferred onto another instrument or to a PC.

5.3 Hardware Configuration

The Hardware Configuration allows the user to manipulate the different hardware components that are connected on the Microlab 300 instrument. At this point in time, there is only the Disposable Tip Hand Probe which needs hardware configuration. The Disposable Tip hand probe can be configured to right- or left-hand use as described in Section 4.1 As more hardware components are developed for the instrument, they will be added here.

5.4 Software Configuration

The Software Configuration menu allows the user to review and modify software settings.

5.4.1 Setting the Date and Time

5.4.2 Setting the Elevation

5.4.3 Calibrating the Controller Touchscreen

5.4.4 Screen Power Off

5.4.5 Firmware/Software Versions

5.4.6 SD Card Capacity and System Memory

5.4.7 System Trace Logging

5.4.8 System Calibration Date

5.4.1 Setting the Date and Time

To set the Date and Time, the user must press the Configuration button from the Main Menu screen and then the Software button. From here the user will need to press the Controller View button. Using the toggle buttons, the user can highlight and select Date and then use the change buttons to set the appropriate date. Likewise, this process may be repeated for setting the Time.

5.4.2 Setting the Elevation

As discussed in Section 5.2.2, the Microlab 300 ships with three standard Liquid Classes for pipetting aqueous, volatile and viscous solutions. The Microlab 300 standard Liquid Classes were developed under factory conditions at 1,300 meters above sea level. However, as altitude increases and air pressure decreases, the volume aspirated by the Microlab 300 syringes is reduced. Thus, the instrument must be calibrated at ambient air pressure to accurately aspirate and dispense the defined volume.

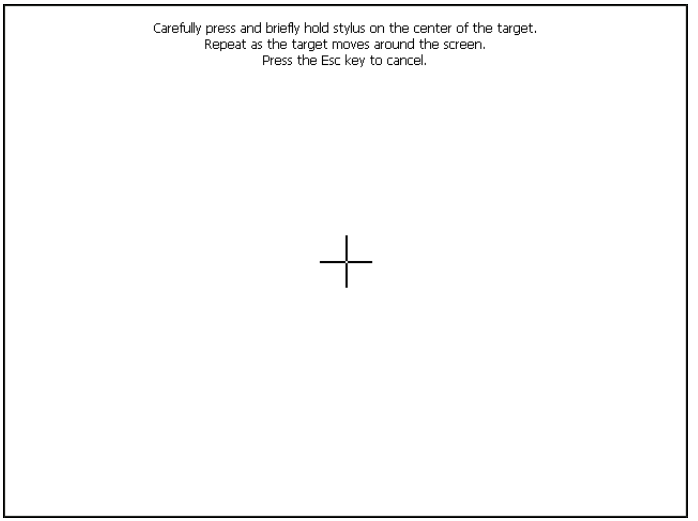
The three standard Liquid Classes can be adjusted to compensate for the difference in elevation at a customer site. Within the Controller screen in the Software configuration menu, a user can input the elevation of his laboratory (measured in meters). The three standard Liquid Classes will automatically be adjusted based on the new elevation.

Note: When creating new liquid classes, there is no need to compensate for elevation because the data collected and entered into the software was gathered in real-time and not at the factory. Elevation compensation will only be used for the three standard Liquid Classes shipped with the system.

5.4.3 Calibrating the Controller Touchscreen

The controller touchscreen is calibrated before it leaves Hamilton Company. If the clicked area on the touchscreen does not seem to align with the image on the screen, it is probably time to recalibrate the screen.

Step 1. To reset the touchscreen calibration, select the Software icon from the Configuration screen. Next select the Controller View button and scroll down to the Screen Calibration option and press Calibrate. The following screen should appear.


Carefully press and briefly hold stylus on the center of the target.
Repeat as the target moves around the screen.
Press the Esc key to cancel.

Step 2. Press the center of the cross.

Step 3. The cross will move to different locations on the screen. Each time the cross stops moving, press the center.

Step 4. Once all 5 positions have been recorded, press anywhere on the screen to store the calibration values.

If the calibration is so far off that it is impossible to navigate to Screen Calibration, as described in Step 1, it is possible to get to the calibration program during system start up. Turn the instrument Off and then On. The initial splash screen will display followed by a completely black screen. After a few seconds, the splash screen will appear again. Double click the screen as indicated to enter the calibration program.

5.4.4 Screen Power Off

The Microlab 300 touchscreen is designed to turn off after an extended period of inactivity. The default setting for the power off is 10 minutes. If desired, the power off time can be increased in the Controller configuration screen.

5.4.5 Firmware/Software Versions

The Microlab 300 is controlled by a combination of three different programs. There is firmware on the Syringe Drive Unit which is controlled by software that is running an operating system installed on the Controller. The version information for all three of these programs can be viewed in the Software configuration menu within Versions. Versions of all Wizards and Linked Methods may also be viewed in this screen.

The most current version of the Microlab 300 firmware and software is posted at **www.hamiltoncompany.com/microlab300** under the Technical Information menu. This file can be used to update an older Microlab 300 to the current version of firmware and software. To update the system, download the file and transfer it to the SD card provided with the system. Insert the SD card into the side of the controller. Then navigate to the Utilities menu and select the Update icon. Press start to begin the update and follow on-screen instructions to complete the update.

5.4.6 SD Card Capacity and System Memory

In the Controller configuration screen, there are indicators showing percent memory used on the SD card and the system memory.

5.4.7 System Trace Logging

If the Microlab 300 is having technical difficulties, Hamilton Technical Support staff may require more detailed system trace logs to troubleshoot the problem. This can be enabled within the software configuration menu in the Controller screen. Simply select System Trace Logging and turn this feature on. The system will automatically log additional data from the software application and report this information in the Error log (refer to Section 8.4 for discussion of Error Logs).

Note: The System Trace Logging will be reset to Off if the instrument is powered off.

5.4.8 System Calibration Date

After a system has been calibrated, the calibration date can be stored.

5.5 Security Settings

For laboratories requiring traceability, the Microlab 300 provides the option for users to log in before they can create, edit or run methods. To enable the use of passwords and user accounts, select Security Settings. This screen manages the use of user accounts, the expiration of the user keys and the maximum

number of times an incorrect user key can be entered before the user account is locked. The first time user accounts are enabled the system will automatically create an Administrator account (User ID = Admin and User Key = 7913). Once user Accounts are enabled, the system will force the user to log in as the Administrator before any other settings can be adjusted.

5.6 Log Settings

The Microlab 300 Controller provides the ability to save a log of pipetting activities to the SD card. Logging can be enabled per Wizard or Linked Method. For regulated customers requiring 21 CFR Part 11 compliance, Electronic Signatures can be enabled if the Security Settings are also enabled. Once Electronic Signatures are enabled, all Wizards and Linked Methods must be logged. If multiple systems are used by the same laboratory, a unique Controller name can be entered to simplify the management of log files. The Controller name can be set within the Log Settings Configuration menu. Log files created on the Microlab 300 can be viewed and printed directly from the Controller by purchasing the printer upgrade kit (p/n 61500-04). For more details on the printer option refer to Section 2.12.

The Microlab 300 SD card can store hundreds of log files depending on the number of activities recorded in each log. For archiving purposes Hamilton has provided a PC application available online called LyncStore. This application allows for management and archiving of files transferred from the SD card to a PC. From this PC application you can filter, archive, view and print log files.

Learn more about the LyncStore at www.hamiltoncompany.com.

5.7 User Accounts

User accounts may be created to add a level of security to the Microlab 300 system. The Users screen gives the system's administrator the ability to add users, edit existing users and export and import users via the system's SD card. To enter this screen, User accounts must be enabled under Security settings and a user with access to modify accounts must be logged into the system. For each account that is created, a role (or multiple roles) is assigned to indicate the level of security for each user. Roles include Operator, Configure Hardware, Manage Users, Program Wizards and Linked Methods.

5.7.1 Add User

The Administrator or a user who has the ability to create and edit user accounts may add new users to the system. To add a new user, simply fill in the User ID, First Name, Last Name and set the user role. Once all the settings are input, the Users button on the bottom left of the screen will be enabled. Press this button to exit the screen and save the new account. When you exit the screen, the system will automatically generate a user key for the new account. Record the User ID and the User Key for future reference. It is suggested to modify the user key for the new account upon initial log in to the instrument.

5.7.2 Edit User

This screen is used to modify the settings of an existing user account. A user account consists of a User ID, First Name, Last Name, enabled or disabled flag, user key and user roles. The user roles define what Controller settings a specific user is able to change. Only one account can be set to have Administrator access. All other users can have at least one of the following roles: be able to operate the Wizards or Linked Methods in a run-only mode, be able to modify probe handedness, be able to manage user accounts, or be able to program Wizards or Linked Methods. In addition to editing account information, the Edit User screen allows for the deletion of a user or to reset a user key in the event it is forgotten.

5.7.3 Export and Import Users

To export users, simply press the Export Users button and the data will be saved on the SD card. To import user accounts onto your Controller, insert the SD card that contains the desired user files and press the Import Users button. The user accounts will be uploaded from the SD card onto the new Controller.

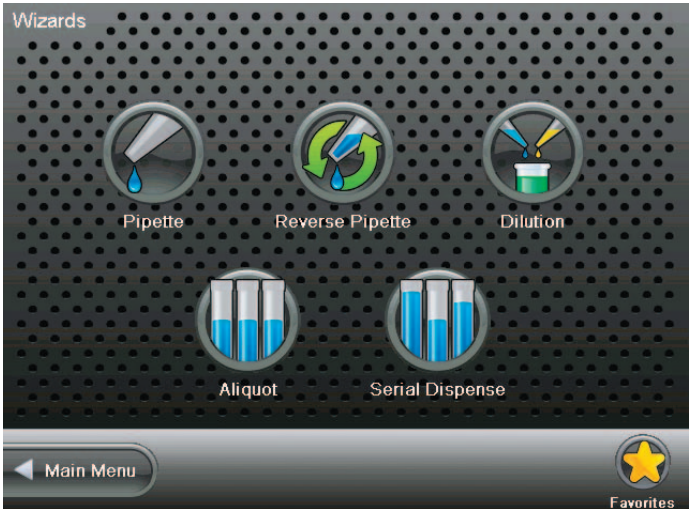
The Microlab 300 SD card can store many user accounts. For archiving purposes Hamilton has provided a PC application available online called LyncStore. This application allows for management and archiving of files transferred from the SD card to a PC. From this PC application you can filter, archive and view user accounts.

Learn more about the LyncStore at www.hamiltoncompany.com.

CHAPTER 6:
Wizards

This section discusses the Wizards for the Microlab 300, including discussions on the following Wizards:

6.1 Wizard Basics
6.2 Pipette Wizard
6.3 Reverse Pipette Wizard
6.4 Dilution Wizard
6.5 Aliquot Wizard
6.6 Serial Dispense Wizard



6.1 Wizard Basics

To simplify the programming of the Microlab 300, Wizards were created for common pipetting applications. These Wizards are designed to enable the user to quickly change from one pipetting technique to the next with minimal time and hassle. This section of the manual describes the features that are common to most Wizards.

6.1.1 Run

6.1.2 Empty Tip

6.1.3 Favorites

6.1.4 Advanced Settings

6.1.1 Run

Run is a small icon button present on every Run screen. This button serves a similar purpose to the Accept button on a hand probe. When the Run button is pressed the instrument will begin to perform the programmed action. To stop immediately press the Back button on the bottom left of the screen or the Cancel button on the hand probe.

6.1.2 Empty Tip

Empty Tip is a small icon button used to empty the volume within a ClickSure tip after an aspiration. This button can be used anytime there is fluid remaining inside the tip. The user will be warned that they are going to empty the tip; this warning allows the user to properly direct the flow into a reservoir or a waste container.

6.1.3 Favorites

Operations that are performed frequently can be stored as Favorites and then recalled for use at a later time. Press the Favorites button to store the current Wizard setup as a Favorite or to change the current Wizard setup to a previously stored Favorite setting. When selecting a previously stored Favorite, the menu will display only the Favorites that were stored for the given Wizard being executed.

6.1.4 Advanced Settings

For most applications, the default settings in each Wizard will provide the best results. For applications that require greater control over the instrument, the Advanced menu provides an interface to adjust the following settings:

Liquid Classes are designed to help the user compensate varying fluid properties. By compensating for different liquid properties, the dispenses from the instrument will be more accurate and precise. The instrument comes with three standard Liquid Classes. Users may also create custom Liquid Classes. See Section 5.2.3 for more details.

Pre-wet (Pipette and Dilution Wizards only). Pre-wet is the optional process of aspirating and dispensing sample to coat the inside of a pipette tip prior to aspirating a defined sample volume. The pre-wet function helps ensure accuracy of viscous liquids by decreasing the cohesive forces between tip and sample. Pre-wet also helps with volatile fluids as evaporation within the tip can cause a significant loss of sample before delivery. Pre-wet increases the humidity within the tip, thus reducing both the amount of variation and sample evaporation. It is recommended to use this setting for volatile or viscous fluids to improve pipetting accuracy. If enabled, the ClickSure tip will be pre-wetted three times prior to the sample aspiration.

Mix (Pipette and Dilution Wizards only.) This setting allows a user to mix after performing a pipetting or dilution step. The user may select the volume to mix. If enabled, pressing the Accept button will begin the repeated aspiration and dispense cycle. Pressing the Accept button again will end the mixing cycle.

6.2 Pipette Wizard

This Wizard is used to aspirate and dispense single samples. Once the system is primed, pressing the Accept button causes the defined amount of sample to be aspirated into the ClickSure tip. A second press of the Accept button causes the liquid to be dispensed from the ClickSure tip into the destination vessel.

6.3 Reverse Pipette Wizard

This Wizard is used to aspirate and dispense single samples. During a Reverse Pipette, the system will aspirate slightly more volume than what is defined. Once the system is primed, pressing the Accept button causes the defined amount of sample to be aspirated into the ClickSure tip plus an additional amount of sample (5 µL when using a 50 µL tip and 25 µL when using a 1 mL tip). A second press of the Accept button dispenses only the defined sample volume, leaving the additional volume in the tip. If the user chooses to repeat the Reverse Pipette function, the additional volume will not be re-aspirated. This volume can be removed from the tip by selecting the Empty Tip icon at the bottom of the Wizard Run screen.

6.4 Dilution Wizard

This Wizard is used to dilute sample with diluent up to 1 mL total volume. Once the system is primed, pressing the Accept button causes the defined amount of diluent to be aspirated into the ClickSure tip. A second press of the Accept button causes the defined amount of sample to be aspirated in the tip. A third trigger of the Accept button will simultaneously dispense both diluent and sample into the desired vessel. The user may also add an Air Gap between the sample and the diluent to ensure that mixing does not occur prior to dispensing.

6.5 Aliquot Wizard

This Wizard is used to repetitively dispense aliquots of the same volume at the press of a button. The total volume (which is the sum of all the aliquots) is drawn into the ClickSure tip and then multiple dispenses are performed based on the volume selected. The volume of each dispense is controlled by the Parameter Adjustment button. The number of aliquots dispensed is indicated on the screen of the Controller. In this Wizard, the system will also aspirate an additional amount of sample volume (5 µL when using a 50 µL tip and 25 µL when using a 1 mL tip) to ensure the pipetting accuracy of each dispense.

6.6 Serial Dispense Wizard

This Wizard is used to repetitively dispense aliquots of differing volumes at the press of a button. The total volume (which is the sum of all the serial dispenses) is drawn into the ClickSure tip and then multiple dispenses are performed as specified. The current dispense volume is controlled by the Parameter Adjustment button. The current dispense volume can be changed at any time. The Edit Steps button shows how many dispenses have been completed out of the total number of dispenses that are programmed. In this Wizard, the system will also aspirate an additional amount of sample volume (5 µL when using a 50 µL tip and 25 µL when using a 1 mL tip) to ensure the pipetting accuracy of each dispense.

Edit Steps

This is the entire list of programmed dispenses that can be edited by pressing the Parameter Adjustment button. This will bring up the programmed dispense volumes. These volumes may be modified, deleted, or additional volumes may be added.

Hold

The Serial Dispense Wizard dispenses volumes from the Edit Steps one at a time in order from the first dispense to the last. When the last dispense is reached it starts over with the first dispense volume. Enabling the Hold functionality causes the current dispense to be dispensed repeatedly until the Hold is disabled at which time the Serial Dispense Wizard will move to the next dispense.

Discrete

The Discrete functionality in the Serial Dispense Wizard allows the user to aspirate and dispense each volume in the Edit Steps one at a time rather than aspirating the total volume of dispenses. The Discrete functionality can be enabled within the Advanced button of the Serial Dispense Wizard.

CHAPTER 7:

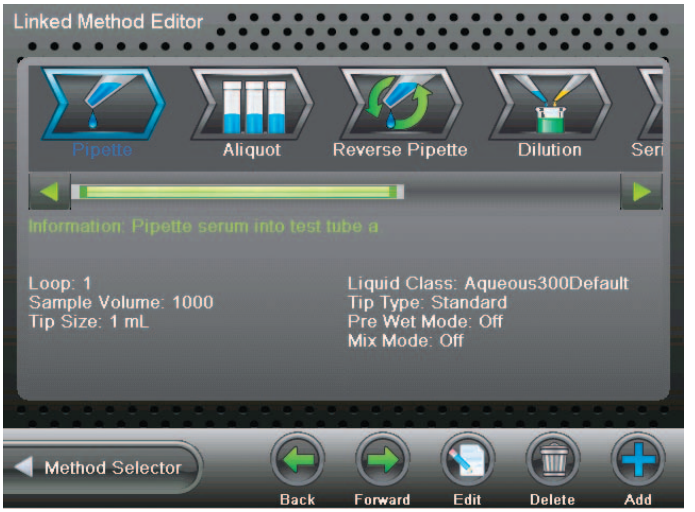
Method Linker

This chapter provides details regarding Linked Methods and includes a discussion of the following topics:

7.1 Overview of Linked Methods
7.2 Creating Linked Methods
7.3 Running Linked Methods
7.4 Editing/Deleting Linked Methods

7.1 Overview of Linked Methods

Linked Methods are useful when a user wants to complete an entire pipetting application from start to finish without having to access each Wizard separately. A Linked Method is a sequence of pipetting Wizards and/or Favorites strung together.



Linked Methods serve as electronic SOPs and produce one log file upon completion. All parameters of each Wizard or Favorite can be modified during the creation of a Linked Method. Instructional prompts can also be added to provide details to the users during the run (e.g. pipette Solution A). Once created, a Linked Method becomes a run-only protocol. Users will not be able to modify any of the parameters when running the method.

7.2 Creating Linked Methods

Step 1. Select the Linked Method icon from the Main Menu screen.

Step 2. Press the New button in the lower right corner. Input the name of the method and press the Save button.

Step 3. To select one of these options, press the button next to the application and select Accept.

Note: If a step is added that is not needed, it may be selected and deleted. If the steps are not in the correct order, a user may move any step by first selecting the step and using the left and right arrows to move the step to the proper location.

Step 4. To change the parameters of a step, select the step. The user is notified that the step is selected when the step becomes highlighted in blue.

Step 5. Press the Edit button. The user will be able to add notes to the method by selecting the Information button, loop a step in a method n times, select the volume to dispense, select the tip size, set the Liquid Class, set the tip type, and set the pre-wet and mix settings. Repeat this with all the steps in the method.

Important! If a user has already created a Favorite of any Wizard, it is possible to use the Favorite as a step in a Linked Method rather than recreating the parameters. Select the method icon in the sequence that you would like to replace with a Favorite of that method. Select the Edit small icon button. On the Settings screen, select the Favorites icon in the bottom toolbar. Finally, press Select to choose the desired Favorite.

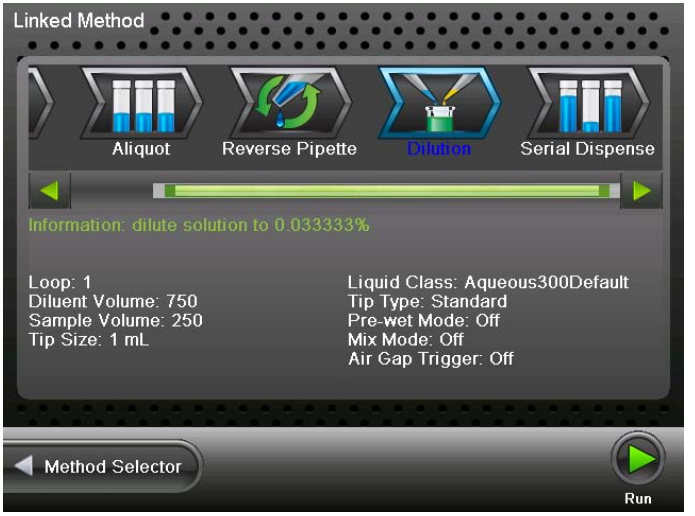
Step 6. When the parameters of each step have been modified, save the method. You will be directed to the list of Linked Methods on the system.

Note: Linked Methods may be duplicated. Simply select the Linked Method that you would like copied and press the Duplicate button. All parameters will be copied and may be modified by selecting the file and pressing the Edit button.

7.3 Running Linked Methods

Step 1. To run a Linked Method select the Linked Method icon from the Main Menu.

Step 2. Select the appropriate Linked Method from the list and press the Run button. The Linked Method Overview screen will display indicating the sequence of steps in the Linked Method.



Step 3. Press the Accept button on the probe to begin the method. The user will be presented with the Run screen of the active Wizard. Each time the user completes a step in the Linked Method, the Linked Method Overview screen will graphically display the progress.

Note: Pressing the Information button at the bottom of each run screen displays the pipetting details and parameters being used in the active Wizard.

Important! If a user makes an error when running a Linked Method, pressing the Cancel button on the probe will bring the user to the Linked Method Overview screen. The user can select any of the steps in the sequence and continue the method at the desired step. If Security is enabled, the user will be asked to provide a written justification of the error and reason for cancellation. This justification will appear in the log file.

Step 4. Continue pipetting until the method is complete. An audible beep will indicate that the method run is complete. At this time, if logging is enabled, a log file will be generated and stored on the SD card.

7.4 Editing/Deleting Linked Methods

To edit or delete a Linked Method, select the file that needs to be modified and press the Edit button. If the file needs to be deleted, select the file and press the Delete button.

CHAPTER 8:
Utilities

This chapter focuses on the Utilities of the instrument. In this chapter the following topics will be discussed:

8.1 Priming the Instrument
8.2 Moving the Syringes
8.3 View Log Files
8.4 Transferring Error Logs
8.5 Updating the Instrument Firmware and Software

8.1 Priming the Instrument

This section describes how to properly prime the Microlab 300 before beginning to pipette.

From the Main Menu on the Controller screen select the Prime button. Select the appropriate number of cycles and press the Run button. One cycle consists of one complete syringe aspiration and a complete dispense. The recommended number of prime cycles is 10. If there is still air in the fluid path after the priming, verify that all tubing and syringe connections are tight and repeat the priming until all air bubbles have been removed from the system.

8.2 Moving the Syringes

To remove or install new syringes on the Microlab 300 Series Pipettor, the user must first lower the syringe drive. To raise or lower the syringes, press the Utilities button from the Main Menu and then select the Move Syringes button. There will be two buttons on this page one for raising the syringes and one for lowering the syringes.

8.3 Viewing Log Files

In the Log Viewer, the user may view log files for methods that have been executed on the instrument or print the log file directly from the Controller when connected to the printer upgrade kit (p/n 61500-04). The log file shows the details of the method run including number of loops, tip size, tip type, mix mode, cancellations, sample volume, Liquid Class, and pre-wet mode. The user may also use the LyncStore online service provided by Hamilton to store and view method logs.

Learn more about the LyncStore at www.hamiltoncompany.com.

8.4 Transferring Error Logs

The Error Log screen provides the means to transfer all error logs from the instrument onto the Microlab 300 SD card by pressing the Run button. These files can then be sent to Hamilton for diagnostics.

8.5 Updating the Instrument Firmware and Software

The Update screen allows the user to update the instrument to the latest firmware and software. The update will be downloaded from the website onto the SD card. The SD card can then be placed in the instrument. By selecting Update from the Utilities menu, the instrument will receive the newest firmware and software updates.

CHAPTER 9:

Best Pipetting Practice

To achieve the highest precision and accuracy, we recommend that you follow the following pipetting tips explained in this chapter including:

9.1 Preparing to Pipette
9.2 Aspirating Liquid
9.3 Dispensing Liquid
9.4 Pipetting Highly Viscous Fluids

9.1 Preparing to Pipette

- **Always place the liquid in a suitable vessel. The liquid and the ClickSure tip should have approximately the same temperature.**
- **Use ClickSure filtered tips to prevent contamination by aerosols or foaming solutions in the tip.**
- **Use ClickSure tips only once.**
- **Check whether the set aspiration and dispensing speeds as well as pipetting delays are suitable for the liquid. These parameters can be viewed within the Liquid Class screen. Choose from either the standard Liquid Classes or create a new Liquid Class as described in Section 5.2.3. Be sure that the chosen Liquid Class has been validated for the pipetting method and liquid being used.**

9.2 Aspirating Liquid

Step 1. Pre-wet the new ClickSure tip by aspirating and dispensing the liquid to be pipetted one to three times.

Step 2. Immerse the ClickSure tip into the liquid vertically approximately 3 mm deep. Immersing the tip too deep in the liquid will have adverse effects while immersing the tip too shallow may result in air bubbles.

Step 3. Press the Accept button on the probe to aspirate liquid. Maintain the immersion depth, so that no air is aspirated accidentally.

Step 4. After aspiration, keep the tip in the liquid for approximately 2 seconds, particularly for viscous liquids.

Step 5. After aspiration, pull the tip slowly out of the liquid.

Step 6. Wipe the tip against the container wall to remove any liquid which may be present on the outside of the ClickSure tip.

9.3 Dispensing Liquid

Step 1. When dispensing liquid, place the ClickSure tip at a slight angle against the wall of the well or tube.

Step 2. Press the Accept button on the probe to dispense the liquid.

Step 3. Wait until no more liquid is dispensed.

Step 4. In Pipette and Dilution Wizards, a blowout can either be triggered after dispensing the liquid or can be set to occur automatically.

Step 5. In all other pipetting Wizards, the extra volume remaining in the tip after dispense can be removed by selecting Empty Tip on the Run screen.

9.4 Pipetting Highly Viscous Solutions

- Use the Reverse Pipetting Wizard for viscous solutions, when using the Viscous300Default Liquid Class or when pipetting plasma, serum, or other liquids with high protein content.
- Use a filtered ClickSure tip.
- Set Liquid Class parameters to use slow aspirating and dispensing speeds.
- Set Liquid Class parameters to use an aspirate delay to allow liquid to completely enter the ClickSure tip.
- Set Liquid Class parameters to use a post-dispense delay or a pre-blowout delay to allow the fluid to collect at the end of the tip before being blown out.
- Wipe the tip against the container wall to remove any liquid which may be present on the outside of the ClickSure tip.

CHAPTER 10:

Icon Index

This chapter will define the function and purpose of the major icons used throughout the user interface.

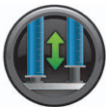
Main Menu Icons

Icon	Function
	Prime – Press to set the number of prime cycles and prime the instrument.
	Wizards – Press to select from a list of available Wizards.
	Linked Method – Press to create a Linked Method. Linked Methods are created by linking multiple Wizards or Favorites together to create one run file.
	Configuration – Press to set Liquid Class, hardware settings, software settings, security settings, log settings and user accounts.
	Utilities – Press to prime the instrument, move the syringes, view logs, transfer error logs and update the system.

Wizards Menu Icons

	Pipette – Press to enter the Run screen for the Pipette Wizard.

Icon	Function
	Reverse Pipette – Press to enter the Run screen for the Reverse Pipette Wizard.
	Dilution – Press to enter the Run screen for the Dilution Wizard.
	Aliquot – Press to enter the Run screen for the Aliquot Wizard.
	Serial Dispense – Press to enter the Run screen for the Serial Dispense Wizard.
Configuration Menu Icons	
	Liquid Classes – Press to create, edit, import and export Liquid Classes.
	Hardware – Press to select and configure the button mapping on the Disposable Tip Hand Probe.
	Software – Press to review and modify the date, time, screen calibration, screen power off settings, internal storage usage, Wizard versions, and pump versions.
	Security Settings – Press to review and modify user accounts required, max login retries, key life span and key expiration warning. This will only be used if Security is enabled.
	Log Settings – Press to review and modify electronic signatures, enforce adherence to the Linked Method order, view log path, select methods to log and set a custom Controller name.

Icon	Function
	Users – Press to edit, add, export or import users to the instrument.
Utilities Menu Icons	
	Prime – Press to set the number of prime cycles and prime the instrument.
	**Move Syringes** – Press the raise or lower the syringe drive for syringe replacement.
	Log Viewer – Press to view and print logged methods.
	Error Log – Press to transfer error log files to the SD Card. This will be used for diagnostic purposes at Hamilton Company.
	Update – Press to update the Microlab 300 software and firmware to the version that is present on the SD Card.
Main Menu Small Icons	
	Log In – Press to log into the instrument using an Administrator or User account.
	Log Off – Press to log off of the instrument.
	Favorites – Press to recall all applications that are frequently used and saved as a Favorite.

Wizards Small Icon Buttons

Icon	Function
	Run – Press to trigger the instrument. This icon functions identically to the Disposable Tip Hand Probe Accept button.
	Empty Tip – Press to empty the solution out of the ClickSure tip.
	Favorites – Press to recall applications within the active Wizard that are frequently used and saved as a Favorite.
	Advanced – Press to see the advanced detail of the current Wizard. See Section 6.1.4 for more details.
	Save – Press to save a method or setting.
	History – Press to view the edit history of a method.
	Select – Press to choose a setting or item from a list.
	Delete – Press to delete a method or file.
	Default – Press to change settings back to their Hamilton default values.
	Up – Press to move a step in the Serial Dispense Editor upward in the sequence.

Icon	Function
	Down – Press to move a step in the Serial Dispense Editor downward in the sequence.
	Duplicate – Press to copy a step in the Serial Dispense Editor. The step will be added directly below the step that was copied.
	Delete – Press to delete a step from the Serial Dispense Editor.
	Add Step – Press to add a new step in the Serial Dispense Editor. This new step will be added to the bottom of the sequence.

Linked Method Small Icon Buttons

Icon	Function
	Run – Press to trigger the instrument. This icon functions identically to the Disposable Tip Hand Probe Accept button.
	Edit – Press to edit a Linked Method or the parameters of a Linked Method step.
	Delete – Press to delete a step in a Linked Method.
	Duplicate – Press to copy a Linked Method.
	New – Press to create a new Linked Method.
	History – Press to view the edit history of a Linked Method.

Icon	Function
	Back – Press to move methods in a Linked Method to the left in the sequence.
	Forward – Press to move methods in a Linked Method to the right in the sequence.
	Add – Press to add a step to a Linked Method.
	Pipette – Press to add a pipette step in a Linked Method.
	Reverse Pipette – Press to add a reverse pipette step in a Linked Method.
	Dilution – Press to add a dilution step in a Linked Method.
	Aliquot – Press to add an aliquot step in a Linked Method.
	Serial Dispense – Press to add a serial dispense step in a Linked Method.
	Timer – Press to add a timer step in a Linked Method.
	Mix – Press to add a mix step in a Linked Method.

Liquid Classes Small Icon Buttons

Icon	Function
	History – Press to view the edit history of a Liquid Class.
	Import Liquid Classes – Press to import Liquid Classes from the SD card onto the instrument.
	Export Liquid Classes – Press to export Liquid Classes from the instrument onto the SD card.
	Duplicate – Press to copy a Liquid Class.
	Delete – Press to delete a Liquid Class.

User Icon Buttons

	Edit User – Press to edit an existing user.
	Add User – Press to add a user.
	Export Users – Press to export users from the Microlab 300.
	Import Users – Press to import users from the Microlab 300.
	Change Key – Press to reset a user key.

Icon	Function
	Delete User – Press to delete a user.
	Edit – Press to edit the parameters of a user account.
	History – Press to view the edit history of a user account.

CHAPTER 11:

Care and Maintenance

This chapter contains instructions for routine maintenance procedures for the Microlab 300, which includes the following topics:

11.1 Daily Maintenance
11.2 Weekly Maintenance
11.3 Yearly Maintenance
11.4 Instrument Calibration
11.5 Cleaning the Microlab 300
11.6 Storing the Microlab 300
11.7 Replacement Component Installation

11.1 Daily Maintenance

It is recommended to prime the Microlab 300 Pipettor daily to ensure the accuracy and precision of the instrument. The recommended system fluid is deionized water. Over time solutions like water will degas which creates air bubbles in the system. The air in the system may lead to inaccuracies during pipetting applications.

11.2 Weekly Maintenance

System fluid path requires health maintenance to prevent clogs which would prevent device from performing per calibration. It is recommended to change the deionized water in the fill reservoir once a week to avoid contaminants which may cause clogs in the instrument's fluid path and thus prevent the instrument from performing per calibration.

11.3 Yearly Maintenance

It is recommended that the Microlab 300 be sent to a service center for cleaning and lubrication on an annual basis. Upon receiving the instrument, a Hamilton technician will evaluate the instrument to make sure it is in good working order. The belts will be replaced and the lead screw and shaft will be cleaned and replaced if necessary. The lead screw and shaft will be lubricated. Finally, the instrument will be retested and recertified for calibration.

11.4 Instrument Calibration

Many companies require that instrumentation, including the Microlab 300, be validated on a monthly, semi-annual or annual basis. The instrument can be sent to Hamilton Company for recertification at any time. Simply contact Hamilton Customer Service to obtain a Return Materials Authorization (RMA) number.

Note: Sending the Microlab 300 in for non-warranty service will be charged to the customer.

Hamilton's validation procedure for accuracy and precision are performed according to the ISO-8655 standard. There are instructions on validating the Microlab 300 on our website at **www.hamiltoncompany.com/microlab300**.

Using the density (g/mL) and the mass values of the pipetted fluid at each volume used in calibration, the Microlab 300 determines compensation factors. The factors are calculated from volume point to volume point for the specific pipetting technique being used. The compensation factor is also used below the lowest volume in the range and above the highest volume point in the range to extrapolate additional data points beyond those measured during calibration. Hamilton recommends completing a gravimetric test to check the validity of the compensation factors.

Should you choose to calibrate the Microlab 300 without sending the instrument to Hamilton Company, please follow the following calibration routine:

11.4.1 Calibration Routine

Step 1. Prime the system. Reference Section 2.10 for priming instructions.

Step 2. Enter Liquid Classes from the Configuration screen.

Step 3. Create a new Liquid Class by selecting the Microlab 300 standard Liquid Class Aqueous300Default and then selecting Duplicate at the bottom of the screen.

Step 4. Enter a name for the new Liquid Class. It is recommended to name the calibration Liquid Class such that it is recognized as a calibration curve. For example, Calibration22Oct2012.

Step 5. Find the new Liquid Class on the Edit Classes screen and select Edit. Because you duplicated the standard Liquid Class for deionized water (Aqueous300Default), all parameters including the Liquid Density and speeds should be set appropriately for instrument calibration using deionized water.

Step 6. Select the Number of Replicates that you will pipette at each volume point. It is recommended that you select a number of replicates between 3 and 5.

Step 7. Select the tip size and type you would like to calibrate. Press Edit. Once again, all parameters for the Liquid Class should not need to be modified as described in Step 4.

Note: If pipetting over the complete volume range of the Microlab 300, it will be necessary to perform the calibration routine with both tip sizes, once for the 50 µL tip and once for the 1 mL tip. Calibration will also need to be performed for each tip type (non-sterile, sterile, or sterile/filtered) intended to be used with the Liquid Class.

Step 8. Press the Data Points icon in the lower right corner of the screen. All data points will be pre-populated from the duplication of the original curve.

Step 9. Add or delete volume points using the icons at the bottom of the screen. For instrument calibration it is recommended that you use a minimum of the volume values indicated in Table 11-1. You may also select volume values that are most commonly used in your pipetting applications.

Table 11-1 Data Points for Instrument Calibration

Tip Size	Volume (µL)	Percentage of Tip
1 mL	1000	100%
	500	50%
	100	10%
	25	2.5%
50 µL	50	100%
	25	50%
	5	10%
	2	4%
	1	2%

Note: In the data points screen there will be a high and low volume point for each tip size that cannot be modified. For example, the 50 µL tip has a high point of 50 µL and a low point of 1 µL. When creating the calibration curve, these high and low volume points will be used. Calibration will also need to be performed for each tip type (non-sterile, sterile, or sterile/filtered) intended to be used with the Liquid Class.

Now, the system can be gravimetrically calibrated for the selected tip size and tip type.

11.4.2 Calibration using the Liquid Class Wizard

Step 1. After adding or deleting volume points as described in Step 9 of the Calibration Routine, select the volume value that you would like to begin calibrating.

Step 2. Select the Wizard icon in the lower right corner of the Liquid Curve Data screen. You have now entered the Liquid Class Wizard Run screen. The number of replicates for each volume value will be indicated by the number of lines in the table.

Step 3. Place a plastic or glass weighing container on the balance and adjust the weight (tare) to zero.

Note: The recording of the weighing results requires the use of a precision balance with a high resolution. Dispensing operations under 10 µL require a balance with a resolution of 0.001 mg.

Step 4. Load the ClickSure tip type and size being used for calibration onto the Disposable Tip Hand Probe.

Step 5. Press the Accept button on the probe to pre-wet the tip with deionized water.

Step 6. Press the Accept button on the Disposable Tip Hand Probe to aspirate the defined volume of deionized water.

Step 7. Press the Accept button on the Disposable Tip Hand Probe to dispense the defined volume of deionized water into the weighing container.

Step 8. Close the door of the balance and, after the mass has stabilized, record the mass value.

Step 9. Repeat Steps 5-8 using the same ClickSure tip for the number of replicates defined.

Step 10. Eject the ClickSure tip.

Step 11. Press the Liquid Curve Data button in the lower left corner to automatically average the mass values provided. The averaged mass value will be populated into the Liquid Curve Data.

Step 12. Repeat Steps 1 – 11 for the additional volume values entered in the Liquid Curve Data screen.

You have now successfully completed instrument calibration for the tip size and type being used. Once again, it will be necessary to perform the calibration routine with both tip sizes, once for the 50 µL tip and once for the 1 mL tip. Calibration will also need to be performed for each tip type (non-sterile, sterile and sterile/filtered) intended to be used with the Liquid Class.

After calibration, validation per ISO-8655 can be performed. Please reference the latest revision of the ISO-8655 specification for the latest procedure. To validate the Microlab 300, follow the instructions below.

Step 1. Select Wizards from the Main Menu screen.

Step 2. Select Pipette from the Wizards screen.

Step 3. Select the Advanced button on the Run screen. Then select the Liquid Class and Tip Type settings that you developed during the calibration routine.

Step 4. Change the Pre-wet setting to On. Then return to the Run screen.

Note: The number of pre-wet cycles is determined in the Liquid Class. If you need to modify the pre-wet settings, refer to Section 5.2.4 for editing Liquid Class instructions.

Step 5. Use the parameter adjustment buttons to input the volume and tip size being tested. It is recommended to validate each tip size at 100%, 50%, and 10% of each tip's total volume capacity per Table 11-1. Follow the latest revision of the ISO-8655 specification for the number of replicates to perform as well as tip reuse instructions.

Step 6. After all of the pipetting data has been collected for both tip sizes, reference Appendix A Table A-1 to validate that your pipetting results comply within the technical specifications of the instrument. Should the results not comply, please contact Hamilton Company for assistance.

11.5 Cleaning the Microlab 300

This section will discuss how to properly clean the Microlab 300 and will include discussions on the following topics:

11.5.1 Deciding When to Clean the Microlab 300

11.5.2 Cleaning the Fluid Path

11.5.3 Cleaning the Exterior of the Microlab 300

11.5.4 Cleaning the Disposable Tip Hand Probe

11.5.1 Deciding When to Clean the Microlab 300

Cleaning the Microlab 300 is dependent on how the instrument is used with respect to the duration of use and types of solutions being used by the system.

We recommend that you clean the instrument daily. The tubing and syringes should be purged and primed at the end of each experiment and/or each work shift. To clean the Microlab 300, flush the system with ethanol or with 10% chlorine bleach and deionized water solution. Avoid using caustic or acidic cleaning solutions.

11.5.2 Cleaning the Fluid Path

For highly critical applications, the Microlab 300 should be cleaned on a regular basis. Use ethanol or 10% dilute chlorine bleach to clean the fluid path. See Appendix C for chemical compatibility with the Microlab 300. Steps on cleaning the fluid path are listed below.

When the tubing and syringes come in contact with contaminated or hazardous samples, follow safe laboratory practices in selecting and using a cleaning fluid to flush out the tubing and syringes.

⚠ **WARNING!** Follow laboratory safety procedures if the Microlab 300 instrument comes in contact with hazardous materials.

Step 1. Prepare a reservoir of cleaning fluid and place the fill tubing in the cleaning fluid reservoir.

Step 2. Direct the hand probe into the cleaning fluid reservoir.

Step 3. Press the Prime button to begin the prime cycle.

Step 4. Continue priming the system until the fluid path is clean. The number of cycles required to clean the fluid path will depend on the level of contamination present in the system. A good estimate is 5 – 10 cycles of the syringes or 5 – 10 times the internal volume of the fill and probe tubing.

Step 5. When the fluid path is clean, press the Pause button to stop the priming cycle.

Step 6. Move the fill tubing from the cleaning fluid reservoir and place it into a reservoir of deionized water.

Step 7. Direct the hand probe towards a waste container.

Step 8. Press the Prime button to continue the prime cycle.

Step 9. Continue priming the system until the fluid path is free of all cleaning fluid. Press the Pause button to stop the priming cycle.

The system is now clean and ready for use.

11.5.3 Cleaning the Exterior of the Microlab 300

The Microlab 300 housing is moderately inert to chemical exposure. However, some chemicals may discolor the surface of the unit.

If a spill occurs on the exterior of the instrument, wipe the surface immediately. Wash the surface using a damp cloth with soap and water. Then dry the area. Make sure liquids do not enter the interior of the Microlab 300.

To disinfect the exterior surface, wipe it down with 10% chlorine bleach and deionized water solution. Then dry the area.

Note: The cleaning guidelines presented here are meant as guide only. If applications require different cleaning solutions, contact Hamilton Company for more information.

11.5.4 Cleaning the Disposable Tip Hand Probe

Clean the probe with an alcohol such as methanol or ethanol. Do not soak the probe or use acetone to clean as acetone may dissolve the plastic housing of the probe. The Disposable Tip Hand Probe is not autoclavable.

Note: The hand probe's fluid path is manufactured from FEP tubing that is chemically inert. For chemical compatibility, please reference the Microlab manual Appendix C.

Biohazard: When using the Microlab 300, always observe Good Laboratory Practices (GLP). Wear suitable protective clothing, safety glass, and protective gloves, particularly when handling biohazardous samples and when dealing with spilled liquids and contaminated areas of the instrument. Avoid touching tips discarded into the laboratory-supplied waste bin. Any surfaces on which liquid is spilled must be decontaminated.

11.6 Storing the Microlab 300

For long term storage, prime and purge the system with ethanol to facilitate drying. Remove the tubing and syringes. Cover the instrument to protect it from damage.

11.7 Replacement Component Installation

This section contains instructions for replacing the components on the Microlab 300 including the following:

11.7.1 Valve Replacement

11.7.2 Syringe Replacement

11.7.3 Tubing Replacement

11.7.4 Battery Replacement

11.7.5 O-ring Replacement

11.7.1 Valve Replacement

In this section the user will learn how to properly replace the valve onto the Microlab 300.

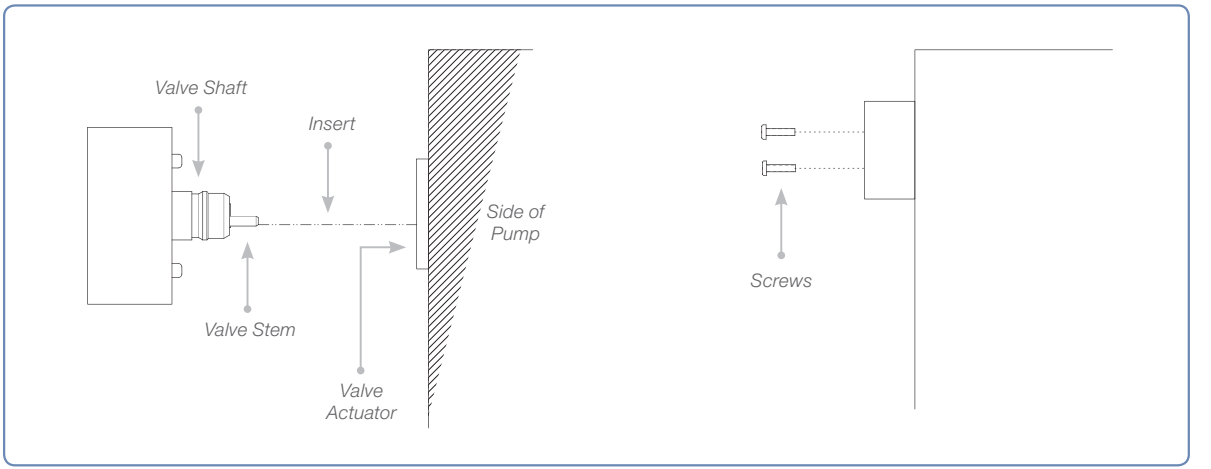


Figure 11-1: Microlab 300 Valve Replacement

Step 1. Be sure both syringes have been removed from the system. Refer to Section 11.7.2 for instructions on removing the syringes.

Step 2. Remove the existing valve. The valve can easily be removed from the instrument by simply unscrewing the two screws and pulling the valve off the instrument.

Step 3. Insert the new valve shaft into the valve actuator and rotate the valve until the valve stem engages with the valve drive. See Figure 11-1.

Step 4. With the valve stem and valve drive engaged, rotate the valve until the alignment pins slip into the front of the instrument. The threaded syringe ports should point down toward the syringe drive mechanism.

Step 5. Install the valve screws to complete the valve mounting. The final assembly of the valve is depicted in Figure 2-12.

11.7.2 Syringe Replacement

In this section, the user will learn how to properly replace the syringes on the instrument.

Step 1. Power the Microlab 300 on using the Power On/Off switch.

Step 2. Press the Utilities button on the Main Menu screen and select the Move Syringes button. In the Move Syringes screen you may choose to raise or lower the syringes. Select lower syringes. The syringe drive should move down.

Step 3. Carefully remove the syringes by turning the thumbscrews at the bottom of each syringe counter clockwise. Then turn the glass barrel of each syringe counter clockwise.

⚠ **WARNING!** Be careful not to break the glass of the syringes during syringes removal or installation. Broken glass could result in bodily harm.

Step 4. Insert the 1.25 mL syringe on the left side of the valve and turn the glass barrel clockwise until it is finger tight. Tighten the thumbscrew at the bottom of the syringe to secure.

Step 5. Carefully insert the 25 µL syringe on the right side of the valve and turn the glass barrel clockwise until it is finger tight. Tighten the thumbscrew at the bottom of the syringe to secure.

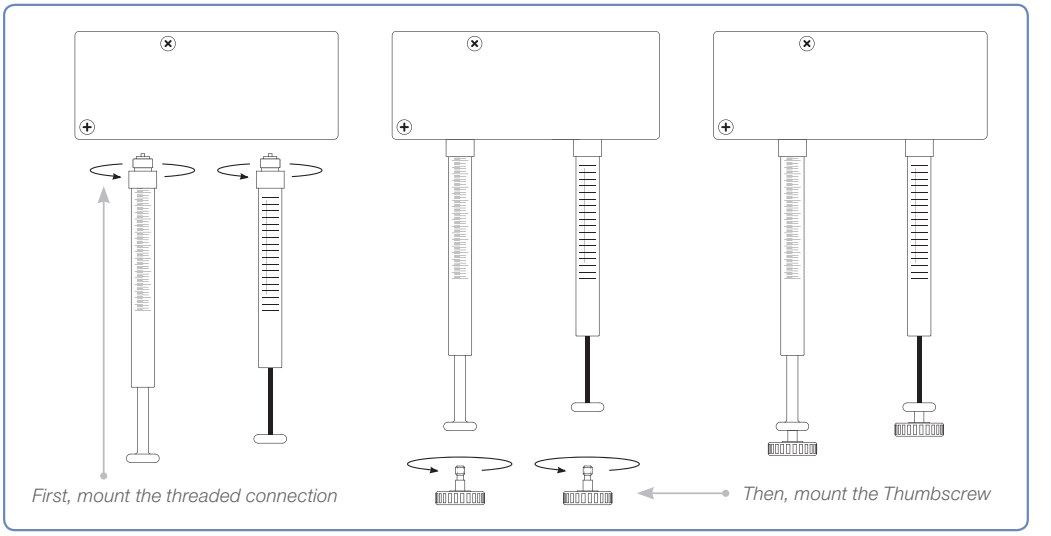


Figure 11-2: Replacing Syringes on the Microlab 300

☆ **Important!** Always tighten syringes so that they are finger tight. Syringes that are over- or under-tightened can cause problems with your Microlab 300 Pipettor. Syringes that are over-tightened may cause leaks or damage to the valve. Syringes that are under-tightened may cause leaks.

⚠ **WARNING!** Use extreme caution when removing cracked or broken syringes. Always wear protective gloves and eye wear.

11.7.3 Tubing Replacement

The Microlab 300 Pipettor has two tubing assemblies. There is a fill tubing assembly that should be attached to the left port of the valve. To replace this tubing, simply unscrew the existing tubing assembly and discard. Follow the directions in Section 2.8 on installing the tubing.

The probe tubing is integrated into the Disposable Tip Hand Probe and attaches to the right port of the valve. Follow the directions in Section 2.8 on installing the probe tubing on the system. To replace the probe tubing, follow the instructions below.

To replace the tubing on the Disposable Tip Hand Probe, the existing tubing needs to be removed first.

11.7.3.1 Removing Old Probe Tubing

Step 1. Unscrew the tube fitting from the valve. Unplug the probe cable from the instrument. Remove the tubing and probe cable from the Cable Manager.

Step 2. Unscrew the probe tip and discard.

Step 3. Cut off the tubing end with the ferrule and stainless steel ring and unthread the fitting.

Step 4. Begin by pushing the tube out through the tip of the hand probe. Then pull the remaining tubing out and discard.

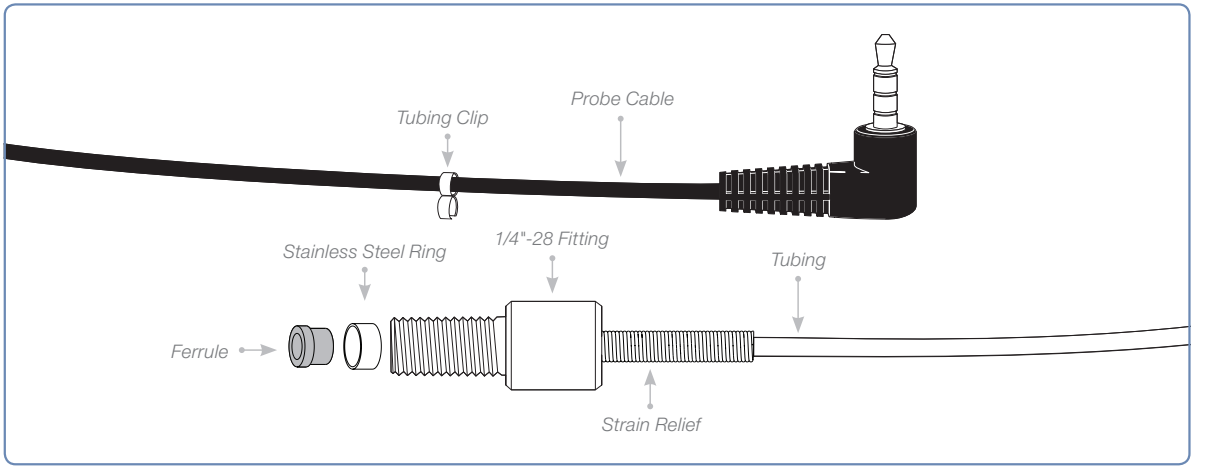


Figure 11-3: Exploded view of Disposable Tip Hand Probe cable and tubing

11.7.3.2 Installing New Probe Tubing

Step 1. Gently thread the tubing through the tip of the hand probe. The end without the flange should go into the probe first. As the tubing is being pulled through the probe, thread the tubing through the tubing clips on the probe cable. Pull the tubing until the flange seats inside the end of the probe.

Step 2. Screw the new probe tip onto the probe, and tighten to ensure a good seal.

Step 3. Place the strain relief followed by the ¼"-28 threaded fitting on the non-flanged tubing end with the threads facing the end of the tubing. Move the fitting down the tubing so it does not interfere with the next steps.

Step 4. Place the stainless steel ring and the yellow ferrule on the non-flanged tubing end. The correct orientation of the stainless steel ring is important; the thinner edge of the ring should face toward the fitting as shown in Figure 11-3.

Note: Correct orientation of the ferrule is with the thinner side facing the fitting.

Step 5. Once all the pieces are assembled onto the tubing, wet the fitting using deionized water. Screw the fitting into the valve while lightly pressing the tubing into the valve to ensure a flush connection. The stainless steel ring will compress onto the ferrule and create a tight connection between the valve and tubing.

Step 6. Re-thread the tubing and probe cable into the Cable Manager by weaving under each tab. Plug the probe cable into one of the two probe receptacles on the instrument.

11.7.4 Battery Replacement

In the Controller, there is a battery to maintain the date and time in the event that power is lost to the instrument. Should the battery fail, the Controller will need to be sent in for service. The battery should have a life of 10 or more years.

11.7.5 O-ring Replacement

Step 1. Gently grasp and hold the ejection sleeve up on the probe.

Step 2. Use forceps or tweezers to remove the old O-ring from the groove on the probe.

Step 3. Discard the old O-ring.

Step 4. Gently thread the replacement O-ring onto the end of the probe and into the groove.

CHAPTER 12:

Troubleshooting

This chapter includes information on troubleshooting the Microlab 300, which includes the following topics:

12.1 Troubleshooting Guide

12.2 Getting Technical Support

12.3 Returning Instruments for Repair

12.1 Troubleshooting Guide

This section contains information on troubleshooting the Microlab 300 instrument.

Table 12-1 Troubleshooting Guide

Problem	Possible Causes	Corrective Action
Instrument does not power on.	Disconnected power cord or faulty power outlet.	Connect power cord and check power source.
	Faulty power supply.	Check the power supply to see if the light is on when plugged in.
Instrument functions normally, but display screen fails to illuminate.	Controller unit not plugged into the Syringe Drive Unit.	Check to see that the Controller unit is plugged into the Syringe Drive Unit.
	Faulty LCD.	Call the Hamilton Service Department.
	Faulty pump circuit board.	Plug power supply directly into the Controller. If the Controller illuminates then there is an internal problem with the Syringe Drive Unit. Call the Hamilton Service Department.
	Faulty Controller cable.	Call the Hamilton Service Department.
Syringe drive is non-responsive and Controller displays “Device is not connected.”	Power adapter is plugged into the Controller and not the Syringe Drive Unit.	Plug the power supply into the Syringe Drive Unit.
	Controller cable is connected into the Accessory port and not the Controller port on the Syringe Drive Unit.	Plug the Controller cable into the Controller port of the Syringe Drive Unit.
Instrument does not fill or dispense.	Faulty or blocked tubing; blocked or leaky fluid path.	Check tubing, valve, and syringes for a blockage, crimps, or loose fittings; replace tubing; either replace valve and syringes or tighten valve and syringes.
	Faulty Controller.	Call the Hamilton Service Department.
	Non-functional Syringe Drive Unit.	Call the Hamilton Service Department.
	Valve does not rotate (valve drives are not engaged or valve is faulty).	Call the Hamilton Service Department.
	Power is applied to Controller and not the Syringe Drive Unit.	Plug the power supply into the Syringe Drive Unit.

Problem	Possible Causes	Corrective Action
Persistent air or leaks in the fluid path.	Loose, worn, or incorrect tubing fittings.	Hand-tighten the fittings or replace old tubing with new tubing.
	Fill tubing is not fully submerged in the reservoir.	Make sure the fill tube is fully submerged in the reservoir.
	Dispense speed is too slow to dislodge the bubbles from the fluid path.	Increase dispense speeds.
	Damaged or worn syringe or plunger tip.	Replace the syringe.
	Damaged valve.	Replace the valve.
System fluid leaks from syringes.	Loose syringes.	Tighten the syringes.
	Damaged or worn syringe or plunger tip.	Call the Hamilton Service Department.
Instrument gives inaccurate or imprecise results.	Controller cable is connected into the Accessory port and not the Controller port.	Replace the syringe.
Instrument does not fill or dispense.	Air exists in the fluid path.	▶ Check to see that fill tubing is totally submerged in reservoir. ▶ Check to see that tubing connections are tight; replace if necessary. ▶ Check to see that the syringes are installed correctly and that they are not leaking. ▶ Replace worn or leaking valves or tubing. ▶ Increase dispense speed to dislodge air bubbles from the system.
	Liquid Classes are not set correctly.	Reset Liquid Classes to the application solution.
Unit is overheated.	Inadequate ventilation, room temperature too high, or duty cycle too high.	▶ The unit is overheated. Power it off and allow it to cool down. ▶ Resume use at a lower duty cycle.

12.2 Getting Technical Support

If a problem persists even after attempts to correct it, contact Hamilton Company Technical Support or Service Department. To expedite service, please have the instrument part number and serial number ready and available. Please be able to provide application specific information (drive speeds and liquids being used).

In the United States and Canada:

Hamilton Company, Inc.
4970 Energy Way
Reno, Nevada 89502

Customer Service
+1 (888) 525-2123

Technical Support/Service
+1 (800) 648-5950

Outside the U.S.
+1 (775) 858-3000

In Switzerland:

Hamilton Bonaduz AG
Via Crusch 8
Ch-7402 Bonaduz, GR,
Switzerland

Customer Service
+41 81-660-60-60
Fax +41 81-660-60-70

12.3 Returning Instruments for Repair

Before returning an instrument to Hamilton please contact Hamilton Company and request a Returned Materials Authorization number (RMA).

Note: Do not return instruments to Hamilton Company without an RMA number. This number assures proper tracking of your instrument. Instruments that are returned without an RMA number will be sent back to the customer without being repaired.

Biohazard: The Microlab 300 instrument MUST be decontaminated before it is returned to Hamilton Company. To decontaminate the instrument, remove health hazards, such as radiation, infectious diseases, corrosive agents, etc. Provide a complete description of any hazardous materials that have been used with the instrument.

Biohazard: Hamilton Company reserves the right to refuse a return shipment of any Hamilton product that has been used with radioactive, microbiological substances, or any other material that could be hazardous to Hamilton employees.

Important! Do not return syringes, tubing or valves with your instrument. Hamilton Company will assume that they pose a health hazard and will destroy them.

Appendices

Appendix A – Technical Specifications

Table A-1 Technical Specifications

Problem	Possible Causes
Accuracy	Refer to Table A-2
Precision	Refer to Table A-2
Syringe size	25 µL and 1.25 mL
Volume range	0.5 – 1000 µL
Fluid path	Borosilicate glass, PTFE, CTFE, PFA, FEP
Program memory	2 GB
Communication type	Serial
Power requirements	100 – 240V 1.5A max 50 – 60 Hz
Power rating	24 VDC, 2.5A
Certifications	CE, IVD[1], CSA Installation category I and Pollution degree 2[2]
Dimensions	6.5 x 7.0 x 14 inch (165.1 x 177.8 x 355.6 mm)
Weight	6.5 lbs (2.9 kg)
Shipping dimensions	19 x 10.1 x 11 inch (482.6 x 256.5 x 279.4 mm)
Shipping weight	11.5 lbs (5.2 kg)
Operating temperature	41 – 104 °F (5 – 40 °C)
Storage temperature	-4 – 158 °F (-20 – 70 °C)
Humidity range	20 – 90% non-condensing
Compliance	FCC Part 15, Class B; EMC: EN 61326-1, Class B

Indoor Operation and Use Only
1 – only for the instruments that are designated for IVD
2 – Per Section 3.6.6.2 "pollution degree 2" is defined as "normally only non-conductive pollution occurs (addition of foreign matter, solid, liquid or gaseous (ionized gasses), that may produce a reduction of dielectric strength or surface resistivity)." Occasionally, however a temporary conductivity caused by condensation must be expected.
The data for accuracy and precision only applies after instrument calibration using Hamilton ClickSure pipette tips.

Table A-2 Microlab 300 Accuracy and Precision Specifications for Deionized Water

Volume (µL)	Accuracy (±%)	Precision (+%)
0.5	7.00%	8.00%
1.0	4.00%	4.00%
5.0	1.50%	1.00%
10	1.00%	0.90%
20	0.90%	0.65%
25	0.85%	0.60%
50	0.80%	0.50%
100	0.80%	0.40%
200	0.75%	0.35%
250	0.75%	0.35%
500	0.75%	0.35%
750	0.50%	0.20%
1000	0.40%	0.15%

The data for accuracy and precision only applies after instrument calibration using Hamilton ClickSure pipette tips.

Table A-3 Microlab 300 Accuracy and Precision Specifications for Bovine Serum Albumin (87 mg/mL)

Volume (µL)	Accuracy (±%)	Precision (+%)
1	27.99%	7.42%
5	8.42%	3.34%
10	5.61%	1.95%
25	2.34%	0.60%
50	1.60%	0.50%
100	0.86%	0.40%
500	0.57%	0.35%
1000	0.40%	0.15%

The data for accuracy and precision only applies after instrument calibration using Hamilton ClickSure pipette tips.

Table A-4 Microlab 300 Accuracy and Precision Specifications for Isopropyl Alcohol (99.5%)

Volume (µL)	Accuracy (±%)	Precision (+%)
1	20.53%	9.80%
5	8.71%	1.24%
10	7.60%	0.90%
25	4.02%	0.87%
50	2.70%	0.53%
100	1.82%	0.66%
500	0.76%	0.35%
1000	0.50%	0.18%

The data for accuracy and precision only applies after instrument calibration using Hamilton ClickSure pipette tips.

Appendix B – Replacement Parts and Accessories

Table B-1 Replacement Syringes

Description	Part Number
25 µL, Microlab 300 syringe	66088-15
1.25 mL, Microlab 300 syringe	66088-40
Thumbscrew (1/pack)	66829-01

Table B-2 Replacement Controller Parts

Description	Part Number
Controller cable	66063-01
Microlab 300 SD card	67255-01

Table B-3 Replacement Valves

Description	Part Number
Microlab 300 Valve Assembly	66008-01

Table B-4 Replacement Tubing

Description	Part Number
12 gauge fill tubing	61614-01

Table B-5 Disposable Tip Hand Probe and Tips

Description	Part Number
Disposable Tip Hand Probe	63960-01
Tubing Kit[1]	67098-01
O-ring Kit (5 pack)	67103-01
50 µL, non-sterile ClickSure tips, 960 tips racked	235537
50 µL, non-sterile ClickSure tips, 960 bulk	235543
50 µL, sterile ClickSure tips, 960 tips racked	235536
50 µL, sterile, filtered ClickSure tips, 960 tips racked	235544
1 mL, non-sterile ClickSure tips, 960 tips racked	235539
1 mL, non-sterile ClickSure tips, 960 bulk	235545
1 mL, sterile ClickSure tips, 960 tips racked	235538
1 mL, sterile, filtered ClickSure tips, 960 tips racked	235546
Tubing clips (5 pack)	88990

1- Includes 5 ferrules, 5 stainless steel rings, 5 ¼"-28 fittings, 5 strain reliefs, 12 gauge tubing and a probe tip.

Table B-6 Microlab 300 Cable Management

Description	Part Number
Cable Management System	65160-01
Accessory Holder	65176-01
Cable Manager	65169-01
Probe Holder	65461-01
Thumbscrew (1/pack)	65164-01

Table B-7 Power Supply

Description	Part Number
Power supply	61092-01

Table B-8 Replacement Power Cords

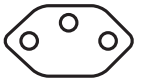
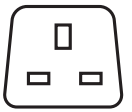
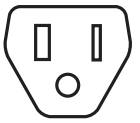
Description	Country	Diagram of Plug	Part Number
CH	Switzerland		355008
Standard CEE 7/7	Continental Europe, Russia, Schuko		3892-01
Standard AS 3112	Australia, New Zealand, Argentina, China		3892-02
Standard BS 1363	UK, Ireland, Malaysia, Middle East		3892-03
Standard NEMA 5-15p	USA, Canada, Mexico, Central America, Brazil		3892-05

Table B-9 Accessories

Description	Part Number
Cable Management System	65160-01
Tubing Clips (5/pack)	88990

Table B-10 User Manual

Description	Part Number
Microlab 300 User Manual	67258-01

Appendix C – Chemical Compatibility

This section contains information about chemical compatibility with the Microlab 300 instrument at room temperature. The fluid path consists of the inside syringe barrel which is made of borosilicate glass, the tip of the syringe plunger which is made of PTFE and the internal valve components which are made of PTFE and CTFE.

LEGEND:

0 = No data available

A = No effect, excellent

B = Minor effect, good

C = Moderate effect, fair

D = Severe effect, not recommended

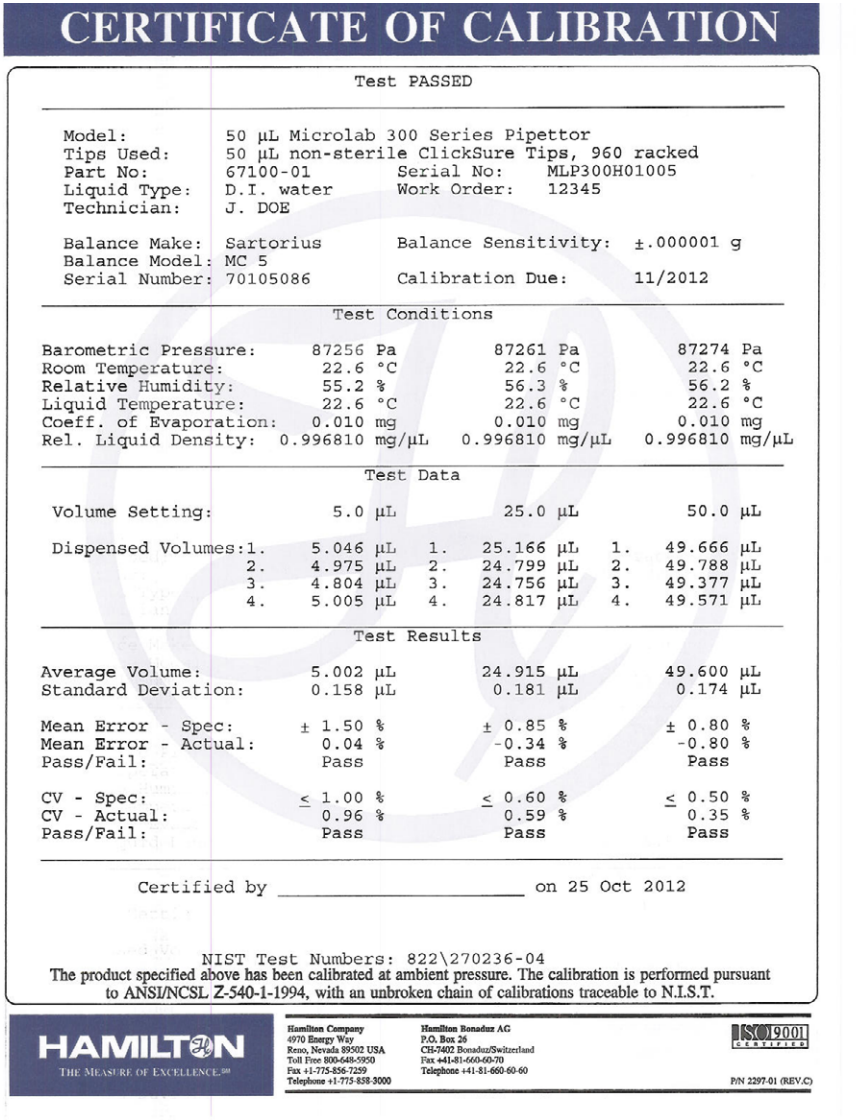
Chemical	PTFE	Borosilicate Glass	CTFE (Kel-F)
Acetaldehyde	A	A	A
Acetates	A	B	A
Acetic acid	A	A	A
Acetic anhydride	A	0	A
Acetone	A	A	A
Acetonitrile	A	A	A
Acetyl bromide	A	0	0
Ammonia	A	A	A
Ammonium hydroxide	A	0	A
Ammonium phosphate	A	0	A
Ammonium sulfate	A	0	A
Amyl acetate	A	A	A
Aniline	A	A	A
Benzene	A	A	B-C
Benzyl alcohol	A	A	A
Boric acid	A	0	A
Bromine	A	A-B	A

Chemical	PTFE	Borosilicate Glass	CTFE (Kel-F)
Butyl acetate	A	A	A
Butyl alcohol	A	A	B
Carbon sulfide	A	A	A
Carbon tetrachloride	A	A	B-C
Chloracetic acid	A	A	A
Chlorine, liquid	A	A	B
Chlorobenzene	A	0	B
Chloroform	A	A	B
Chromic acid	A	A	A
Cresol	A	A	A
Cyclohexane	A	A	B
Ethers	A	A	B
Ethyl acetate	A	A	B-C
Ethyl alcohol	A	A	0
Ethyl chromide	A	0	B
Ethyl ether	A	0	A-B
Formaldehyde	A	A	A
Formic acid	A	A	A
Freon 11, 12, 22	A	A	B-C
Gasoline	A	A	A
Glycerin	A	A	A
Hydrochloric acid	A	A	A
Hydrochloric acid (conc)	A	A	A
Hydrofluoric acid	A	D	B
Hydrogen peroxide	A	A	B
Hydrogen peroxide (conc)	A	A	B
Hydrogen sulfide	A	0	A-B
Kerosene	A	A	A
Methyl alcohol	A	A	A
Methyl ethyl ketone (MEK)	A	A	A-B

Chemical	PTFE	Borosilicate Glass	CTFE (Kel-F)
Methylene chloride	A	A	B
Naptha	B	0	A
Nitric acid	A	A	A
Nitric acid (conc)	A	A-B	A-B
Nitrobenzene	A	A	A-B
Phenol	A	A	B
Pyridine	A	0	A
Silver nitrate	A	A	B
Soap solutions	A	A	A
Stearic acid	A	A	0
Sulfuric acid	A	A	A
Sulfuric acid (conc)	A	A	A
Sulturous acid	A	0	A-B
Tannic acid	A	0	A-B
Tanning extracts	0	0	0
Tartartic acid	A	0	B
Toluene	A	A	B
Trichlorethane	A	A	B
Trichlorethylene	A	A	B-C
Turpentine	A	A	A
Water	A	A	A
Xylene	A	A	B-C

Appendix D – Instrument Performance Test Reports

The Microlab 300 is shipped with two calibration certificates that validate the instrument successfully completed the gravimetric testing per ISO-8655.



CERTIFICATE OF CALIBRATION

Test PASSED

Model:	50 µL Microlab 300 Series Pipettor		
Tips Used:	50 µL non-sterile ClickSure Tips, 960 racked		
Part No:	67100-01	Serial No:	MLP300H01005
Liquid Type:	D.I. water	Work Order:	12345
Technician:	J. DOE		
Balance Make:	Sartorius	Balance Sensitivity:	±.000001 g
Balance Model:	MC 5		
Serial Number:	70105086	Calibration Due:	11/2012

Test Conditions

Barometric Pressure:	87256 Pa	87261 Pa	87274 Pa
Room Temperature:	22.6 °C	22.6 °C	22.6 °C
Relative Humidity:	55.2 %	56.3 %	56.2 %
Liquid Temperature:	22.6 °C	22.6 °C	22.6 °C
Coeff. of Evaporation:	0.010 mg	0.010 mg	0.010 mg
Rel. Liquid Density:	0.996810 mg/µL	0.996810 mg/µL	0.996810 mg/µL

Test Data

Volume Setting:	5.0 µL		25.0 µL		50.0 µL
Dispensed Volumes:	1. 5.046 µL	1.	25.166 µL	1.	49.666 µL
	2. 4.975 µL	2.	24.799 µL	2.	49.788 µL
	3. 4.804 µL	3.	24.756 µL	3.	49.377 µL
	4. 5.005 µL	4.	24.817 µL	4.	49.571 µL

Test Results

Average Volume:	5.002 µL	24.915 µL	49.600 µL
Standard Deviation:	0.158 µL	0.181 µL	0.174 µL
Mean Error - Spec:	± 1.50 %	± 0.85 %	± 0.80 %
Mean Error - Actual:	0.04 %	-0.34 %	-0.80 %
Pass/Fail:	Pass	Pass	Pass
CV - Spec:	≤ 1.00 %	≤ 0.60 %	≤ 0.50 %
CV - Actual:	0.96 %	0.59 %	0.35 %
Pass/Fail:	Pass	Pass	Pass

Certified by _____ on 25 Oct 2012

NIST Test Numbers: 822\270236-04

The product specified above has been calibrated at ambient pressure. The calibration is performed pursuant to ANSI/NCSL Z-540-1-1994, with an unbroken chain of calibrations traceable to N.I.S.T.

HAMILTON
THE MEASURE OF EXCELLENCE℠

Hamilton Company
4970 Energy Way
Reno, Nevada 89502 USA
Toll Free 800-648-5950
Fax +1-775-856-7259
Telephone +1-775-858-3000

Hamilton Bonaduz AG
P.O. Box 26
CH-7402 Bonaduz/Switzerland
Fax +41-81-660-60-70
Telephone +41-81-660-60-60

ISO 9001 CERTIFIED

P/N 2297-01 (REV.C)

Figure D-1 Example Calibration Certificate

Glossary

Accept button
This button is located on the Disposable Tip Hand Probe and is designed to trigger the syringe drive unit to perform the next step in an application. It is also used to select OK in popup screens or to enable the Run functionality.

Accessory Holder
This component is part of the Cable Management System and connects directly to either side of the Syringe Drive Unit to support the Probe Holder and Cable Manager. See Section 2.6 on functionality and assembly of the Accessory Holder.

Accessory receptacle
This is a port on the Syringe Drive Unit that will be used for future expansion of the Microlab 300 Series Pipettor.

Aspirate
To take in a defined volume of liquid into a ClickSure tip on the Disposable Tip Hand Probe.

Aspirate speed
Defines how quickly the fluid is aspirated. Slower speeds may be used for viscous and/or volatile fluids to prevent cavitation and/or boiling.

Aliquot Wizard
A Wizard in which fluid is distributed multiple times in equal volume increments.

Back button
This button will take the user back to the previous screen.

Blowout
Removing excess fluid remaining in the tip using air in the system.

Button mapping
This function will allow the user to change the handedness on the Disposable Tip Hand Probe to either left- or right-handed.

Cable Management System
This is the component that attaches to either side of the Microlab 300 that holds the Disposable Tip Hand Probe. See Section 2.6 on functionality and assembly of the Cable Management System.

Cable Manager
This component connects to the Accessory Holder of the Cable Management System and helps hold the probe cables and tubing off of the lab bench. See Section 2.6 on functionality and assembly of the Cable Manager.

Cancel button
This button is located on the Disposable Tip Hand Probe and is designed to stop the syringe drive unit from performing an application. It is also used to cancel popup screens or to enable the Empty Tip functionality.

Change buttons
These are buttons that are used to edit fields such as date and time in the different screens.

ClickSure tips
These are the tips that are validated for the Microlab 300 Series Pipettor and are compatible with the Disposable Tip Hand Probe.

ClickSure Tip Volume Indicator
This indicator shows the current volume of solution in the ClickSure Tip.

Configuration screen
This is the screen on the Controller where the user can set Liquid Class, Hardware settings, Software settings, Security Settings, Log Settings and User accounts for the unit.

Controller receptacle
This is the receptacle where the grey, 6 pin Mini DIN Controller cable connects from the Controller to the Syringe Drive Unit.

Controller unit
This component allows the user to send operating instructions to the Syringe Drive Unit.

Cycle
A series of two strokes, aspirate and dispense, that comprise both the up and down movements of the syringe drive mechanism.

Default
A factory setting; for example, a default aspirate speed for each syringe size.

Delete
To remove a method or file.

Delete button
This button removes one character at a time from the value indicator or removes a method or file.

Density
Defines the mass of the fluid per unit volume. Density is measured in g/mL.

Diluent
A liquid that is added to a sample to decrease the sample's concentration.

Dilute
To reduce the concentration of solutes in a sample by adding another fluid. The fluid that is added is called diluent and may be deionized water, for example.

Dilution Wizard
A Wizard designed to allow the user to perform a dilution, where the diluent and sample volumes are not greater than 1 mL.

Discrete
The Discrete functionality in the Serial Dispense Wizard allows the user to aspirate and dispense each volume in the Edit Steps one at a time rather than aspirating the total volume of dispenses.

Dispense
To distribute fluid in a single portion or in several increments from a ClickSure tip on the Disposable Tip Hand Probe.

Dispense speed
Defines how quickly the fluid is dispensed. Slower speeds may be used for viscous fluids to allow them to flow to the end of the tip increasing dispense accuracy.

Display screen
The touchscreen on the Controller that allows the user to program and operate the instrument.

Disposable Tip Hand Probe
The Disposable Tip Hand Probe is the compatible probe for the Microlab 300. The probe accepts two ClickSure tip volume sizes, 50 µL and 1 mL.

Down
Describes the movement of the syringe drive mechanism as it moves away from valve.

Down position
This is the position of the syringe drive mechanism when it is fully extended away from the valve.

Edit steps
This Parameter Adjustment button is the entire list of programmed serial dispenses that can be edited. These volumes may be modified, deleted, or additional volumes may be added.

Ethernet RJ-45
The Ethernet receptacle is located on the back of the Controller. This port will be used for future expansion of the system.

Fluid direction indicator
This indicator shows the direction of fluid movement in or out of the ClickSure tip in the next step.

Fill tubing
A tubing line that connects the fill reservoir to the valve inlet port on the left side of the valve.

Fluid Path
The inside surfaces of the valve, syringe(s) and tubing that contact the system fluid.

Hand probe
See Disposable Tip Hand Probe.

Hold
The Serial Dispense Wizard dispenses volumes from the Edit Steps one at a time in order from the first dispense to the last. When the last dispense is reached it starts over with the first dispense volume. Enabling the Hold functionality causes the current dispense to be dispensed repeatedly until the Hold is disabled at which time the Serial Dispense Wizard will move to the next dispense.

Icon buttons
These buttons are used to provide the major navigation from function-to-function within the user interface.

***In vitro* Diagnostic Device (IVD)**
Devices that are used to perform diagnoses in a controlled environment outside of a living organism.

Keypad buttons
These buttons are used to add and clear numbers and characters from the value indicator.

Keypad toggle
This toggles the keypad between letters and numbers.

Linked Method
The run-only electronic protocol (eSOP) comprised of a sequence of Wizards or Favorites.

Linked Method Editor
The program used to connect several Wizards in a sequence to create a complete pipetting application called a Linked Method.

Liquid Class
A solution setting in the instrument that allows for users to customize their system based on liquid used in the application.

Main Menu
The main screen on the Controller for the Microlab 300. This is the screen used to navigate from and to all other screens.

Memory
The information storage capacity of the instrument.

Method
A complete series of repeatable functions that can be performed by Microlab 300 instruments. These functions may consist of pipetting, aliquoting, diluting, etc.

Mix
This is a Wizard in the Linked Method screen that allows the user to mix a sample by aspirating and dispensing.

Number of pre-wet cycles
The number of aspiration and dispense cycles that will occur prior to aspiration of the desired volume to wet the inside of the ClickSure tip.

Number of replicates
Defines the number of times a particular volume will be pipetted and weighed during gravimetric calibration. The software will calculate the average mass from these replicates and use this average mass value and the density to adjust the data points of a Liquid Class curve.

Numeric keypad
A group of keys on the Controller display that are used to enter numeric data.

OTG USB Port
The OTG USB port is located on the back of the Controller. This port is used for diagnostics and testing at Hamilton Company prior to shipment.

Parameter adjustment buttons
These buttons show the current dispense volume and tip settings. The exact function for these buttons will be defined in greater detail in the Wizards and Linked Method sections of the manual.

Parameter indicator
This indicator shows the value of a parameter but does not allow for the adjustment of the parameter.

Pipette
To measure a fixed amount of liquid with a probe and then dispense that same volume of liquid into a vessel.

Pipette Wizard
A Wizard designed to allow the user to program a pipetting application.

Power cycle
To turn the Microlab 300 off and then back on.

Power down
To turn an electrical device off.

Power on/off switch
The switch on the back of the instrument used to turn the Microlab 300 on and off.

Post-aspirate delay
Defines the amount of time the system waits after an aspiration to allow the system to reach mechanical and pressure equilibrium. The operator is expected to maintain the tip within the fluid during this time interval. Longer delays may be needed to adjust for faster aspirate speeds and/or more viscous fluids.

Post-blowout delay
Defines the amount of time the system waits after dispensing the blowout and before re-aspirating the blowout volume in preparation for the next pipetting activity.

Post-dispense audible
If enabled, an audible buzzer will indicate that a dispense is complete.

Post-dispense delay
Defines the amount of time the system waits after a dispense to allow the system to reach mechanical and pressure equilibrium. The operator is expected to maintain the tip in a proper dispensing position during this time interval. Longer delays may be needed to adjust for faster dispense speeds.

Pre-blowout delay
Defines the amount of time the system waits after dispensing fluid and before dispensing the blowout.

Pre-wet
This is a step setting that allows the user to aspirate and dispense a solution x times to pre-wet the pipette tip that is to be used in the step. This improves the accuracy of the dispense.

Prime
The act of making the Microlab 300 ready for operation by running fluid through the fluid path (tubing, valve, syringes) to remove all air bubbles. The system must be primed prior to use and between fluid changes.

Probe holder
This is part of the Cable Management System that holds the Disposable Tip Hand Probe in place.

Probe receptacle
This is the port where the hand probe connects to the Syringe Drive Unit.

Probe tubing
This is the tubing that is installed in the Disposable Tip Hand Probe.

Range indicator
When putting numerical values for volumes and speeds the pump will have a range indicator depicting the acceptable range for the current setup.

Reservoir
A container that holds the deionized water used to prime the instrument.

Returned Material Authorization number (RMA #)
A number, assigned by Hamilton Company, which is used to trace an instrument in the event it is returned for repair.

Reverse pipette
A pipetting technique during which a user aspirates more solution that what is to be dispensed.

Reverse Pipette Wizard
This Wizard is used to aspirate slightly more volume than what is defined to ensure an accurate dispense.

Run screen
This screen allows a user to control and monitor all aspects of the instrument's activities. Buttons and icons are used to change parameters and indicators are designed to give current and future status of the instrument.

SD card
The SD card is used to store all the methods, Liquid Classes, and users that are on the pump. It is also used to transfer any stored information to another Controller or to a PC.

Serial dispense
During a serial dispense, a user repeatedly dispenses aliquots of differing volumes at the press of a button. The total volume is drawn into the tip and then multiple dispenses are performed as specified.

Serial Dispense Wizard
This Wizard is used to program a serial dispense using the instrument.

Shift button
This button toggles letters from lowercase to uppercase.

Small icon buttons
These buttons provide additional functionality to change values on the current screen.

Speed
See Aspirate speed and Dispense speed.

Syringe drive mechanism
The arms to which the syringe plungers connect. The movement of the syringe drive arms moves the syringe plungers which displaces fluid, drawing it through the system.

Syringe Drive Unit
The heart of the Microlab 300 that contains the valves, syringes, tubing and the syringe drive mechanism.

Syringe initialization
Driving the syringe to the top of stroke towards the valve.

System fluid
The fluid originating from a reservoir that is pumped through the entire system during priming. The recommended system fluid for the Microlab 300 is deionized water.

Timer
The timer is a function in the Linked Method screen that allows the user to insert a time delay after a given method step. This is most commonly used for incubation times.

Tip eject button
This button on the Disposable Tip Hand Probe is pressed when a ClickSure tip is discarded from the probe.

Trigger
To press a button on the Disposable Tip Hand Probe to elicit a response from the instrument.

Tubing clip
A component that attaches to the side of a liquid reservoir to hold tubing lines in the fluid.

Update
This button is used to update the software or firmware of the Microlab 300 instrument.

Value indicator
This indicator displays the current value that will be stored when the Enter button is pressed.

Valve
The component that directs the flow of liquid through the system.

Valve actuator
The valve actuator is part of the Syringe Drive Unit that engages with the valve to rotate the valve to the correct position at the correct time.

Valve drive motor
The valve drive motor is part of the drive unit that controls valve rotation.

Valve port
Openings in the valve assembly through which liquid flows. As the valve turns, ports are opened or closed, directing the flow of liquid through the system tubing.

VDC receptacle
This is the receptacle where the power cord connects to the Syringe Drive Unit to a wall outlet. There is also a VDC receptacle on the Controller used to charge the Controller.

Viscosity
A property of liquid describing its resistance to flow. Alcohol, for example, has a very low viscosity, whereas glycerin has a very high viscosity.

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HAMILTON®

Web: www.hamiltoncompany.com
USA: 800-648-5950
Europe: +41-81-660-60-60

Hamilton Americas & Pacific Rim
4970 Energy Way
Reno, Nevada 89502 USA
Tel: +1-775-858-3000
Fax: +1-775-856-7259
sales@hamiltoncompany.com

Hamilton Europe, Asia, & Africa
Via Crusch 8
CH-7402 Bonaduz, GR, Switzerland
Tel: +41-81-660-60-60
Fax: +41-81-660-60-70
contact@hamilton.ch

To find a representative in your area, please visit hamiltoncompany.com/contacts.